MATHS

BOOKS - TARGET MATHS (HINGLISH)

CONTINUITY

Classical Thinking

1. If : $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & ; x \neq 0 \\ 2 & ; x = 0 \end{cases}$ then :

A. f(x) is discontinous at x = 0

B. $\lim_{x \to 0} f(x) = 1$

C. f(x) is continous at x = 0

D. none of these

Answer: C

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2. If $f(x) = \begin{cases} \frac{1}{2}\left(\sin x^2\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$, then

A. $\lim_{x \to 0} f(x) = \frac{1}{2}$

B. f(x) is discontinuous at x = 0

C. f(x) is continuous at x = 0

D. none of these

Answer: C

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3. If $f(x) = \begin{cases} \left(1 + \frac{4x}{5}\right)^{\frac{1}{x}} & x \neq 0 \\ e^{\frac{4}{5}} & x = 0 \end{cases}$, then

A. $\lim_{x \to 0} f(x) = e^{\frac{2}{5}}$

B. $\lim_{x \to 0} f(x)$ does not exist

C. f(x) is continuous at x = 0

D. f(x) is discontinuous at x = 0

Answer: C

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4. If $f(x) = \sin x - \cos x$, $x \neq 0$, is continuous at x = 0, then f(0) is equal to

A. 1

B. -1

C. -2

D. 2

Answer: B

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5. If $f(x) = \frac{2x + \tan x}{x}, x \neq 0$, is continuous at x = 0, then f(0) equals

A. 0

B. 1

C. 2

D. 3

Answer: D

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6. If the function $f(x) = \begin{cases} \frac{x^2-1}{x-1} & \text{When} \quad x \neq 1 \\ k & \text{When} \quad x = 1 \end{cases}$ is given to be continuous at x=1, then the value of k is ____.

A. -1

B. 2

C. -3

D. -2

Answer: B

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7. If $f(x) = \begin{cases} \frac{\sin 3x}{x} & x \neq 0 \\ \frac{k}{2} & x = 0 \end{cases}$ is continuous at x = 0, then the value of k is

A. 12

B. 9

C. 6

D. 2

Answer: C

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8. Let $f(x) = \begin{cases} \frac{\sin \pi x}{5x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ if f(x) is continuous at x = 0, then k is equal to

A. $\frac{\pi}{5}$

B. $\frac{5}{\pi}$

C. 1

D. 0

Answer: A

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9. If $f(x)$ is continuous at $x = 0$, where $f(x) = \frac{\left(e^{3x} - 1\right)\sin x}{x^2}$, for $x \neq 0$, then $f(0) =$

A. 3

B. e

C. 3e

D. e^3

Answer: A

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10. $f(x) = \begin{cases} (2x+1) & x < 1 \\ 2 & x = 1 \\ x^2 + 1 & x > 1 \end{cases}$ is

A. continuous at x = 1

B. left continuous at x = 1

C. right continuous at x = 1

D. none of these

Answer: C

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11. If $f(x) = \begin{cases} x, \text{ for } 0 \leq x < \frac{1}{2} \\ 1 - x, \text{ for } \frac{1}{2} \leq x < 1 \end{cases}$, then

A. f(x) is continuous at $x = \frac{1}{2}$

B. f(x) is discontinuous at $x = \frac{1}{2}$

C. $\lim_{x \to \frac{1^-}{2}} f(x) = 1$

D. $\lim_{x \to \frac{1^+}{2}} f(x) = 1$

Answer: A

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12. $f(x) = \begin{cases} 2x + 5 & x > 1 \\ k & x = 1 \\ 8x - 1 & x < 1 \end{cases}$, is continuous at x = 1, then value of k is

A. 2

B. 5

C. 7

D. 8

Answer: C

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13. If $f(x) = \begin{cases} kx - 1 & \text{when} x < 2 \\ x + 1 & \text{when} x > 2 \\ 3 & when: x = 2 \end{cases}$ is continuous at x = 2 , then k =

A. 1

B. -2

C. 2

D. 0

Answer: C

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14. If $f(x) = \begin{cases} 2 & 0 \leq x < 1 \\ c - 2x & 1 \leq x \leq 2 \end{cases}$ is continuous at x = 1 , then c equals

A. 2

B. 4

C. 0

D. 1

Answer: B

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15. If $f(x) = \begin{cases} x^2 + k & x \geq 0 \\ -x^2 - k & x < 0 \end{cases}$ is continuous at x = 0, then k is equal to

A. 0

B. 1

C. 2

D. -2

Answer: A

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16. If $f(x) = \begin{cases} 2x + 1 & , \quad x \leq 1 \\ -3 - kx^2 & , \quad x > 1 \end{cases}$ is continuous at x = 1, then the value of k is

A. -6

B. 1

C. -1

D. 2

Answer: A

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17. If $f(x) = \begin{cases} x + \lambda & , \quad x < 3 \\ 4 & , \quad x = 3 \\ 3x - 5 & , \quad x > 1 \end{cases}$ is continuous at x = 3, then λ =

A. 4

B. 3

C. 2

D. 1

Answer: D

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18. $f(x) = \frac{x^2-4}{x-2} + a \quad , \quad \text{for} x < 2$

$= 8 \quad , \quad \text{for} x = 2$

$= x + b + 4 \quad , \quad \text{for} x > 2$

is continuous at x = 2 , then the value of a and b are respectively

A. 2,4

B. 4,2

C. 1,2

D. 2,2

Answer: B

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19. If $f(x) = \begin{cases} ax+1 & , \quad x \leq \frac{\pi}{2} \\ \sin x + b & , \quad x > \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, then

A. a = 1, b =0

B. $a = b\frac{\pi}{2} + 1$

C. $b = \frac{a\pi}{2}$

D. $a = b = \frac{\pi}{2}$

Answer: C

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20. If $f(x) = \begin{cases} x^2 & , \quad \text{when} x \neq 1 \\ 2 & , \quad \text{when} x = 1 \end{cases}$, then

A. $\lim_{x \to 1} f(x) = 2$

B. f(x) is continuous at x = 1

C. f(x) is discontinuous at x = 1

D. none of these

Answer: C

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21. If $f(x) = \begin{cases} x^2 & , \text{when} x \leq 1 \\ x + 5 & , \text{when} x = 1 \end{cases}$, then

A. f(x) is continuous at$x = 1$

B. f(x) is discontinuous at$x = 1$

C. $\lim_{x \to 1^+} f(x) = 1$

D. $\lim_{x \to 1^+} f(x) = 6$

Answer: B

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22. If $f(x) = \begin{cases} x, \text{ for } & 0 \leq x < 1 \\ 2, \text{ for } & x = 1 \\ x+1, \text{ for } & 1 < x \leq 2 \end{cases}$, then f is

A. $\lim_{x \to 1^-} f(x) = 0$

B. $\lim_{x \to 1^+} f(x) = 1$

C. f(x) is continuous at $x = 1$

D. f(x) is discontinuous at $x = 1$

Answer: D

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23. If $f(x) = \begin{cases} x - 1 & , \quad x < 0 \\ \frac{1}{4} & , \quad x = 0 \\ x^2 & , \quad x > 0 \end{cases}$

A. $\lim_{x \to 0^+} f(x) = 1$

B. $\lim_{x \to 0^-} f(x) = 1$

C. f(x) is discontinuous at$x = 0$

D. f(x) is continuous at$x = 0$

Answer: C

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24. If $\begin{cases} \frac{5}{2} & , \quad x < 2 \\ 1 & , \quad x = 2 \\ x - \frac{3}{2} & , \quad x > 2 \end{cases}$, then

A. f(x) is continuous at$x = 2$

B. f(x) is discontinuous at$x = 2$

C. $\lim_{x \to 2} f(x) = 1$

D. none of these

Answer: B

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25. If $f(x) = \begin{cases} 1 + x^2 & , \text{ when} 0 \leq x < 1 \\ 1 - x & , \text{ when} x > 1 \end{cases}$, then

A. $\lim_{x \to 1^+} f(x) \neq 0$

B. $\lim_{x \to 1^+} f(x) \neq 2$

C. f(x) is discontinuous at $x = 1$

D. f(x) is continuous at $x = 1$

Answer: C

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26. If $\begin{matrix} f(y) & = y^2 - y - 1 & , & \text{for} 0 \leq y < 2 \\ & = 4y + 1 & , & \text{for} 2 \leq y \leq 4 \end{matrix}$, then

A. f(y) is continuous at $y = 2$

B. f(y) is discontinuous at $y = 2$

C. $\lim_{y \to 2^-} f(y) = 9$

D. $\lim_{y \to 2^+} f(y) = 1$

Answer: B

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27. If f and g are both continuous at x = a, then f-g is

A. discontinuous at x = a

B. not defined

C. continuous at x = a

D. none of these

Answer: C

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28. If $f(x) = \sqrt{x-2}$, for $2 < x < 4$, then $f(x)$ is

A. f(x) is continuous is (2,4)

B. f(x) is discontinuous is (2,4)

C. f(x) is continuous is (2,4) except at x = 3

D. f(x) is discontinuous is (2,4) except at x = 3

Answer: A

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29. If $f(x) = \begin{cases} x & , \quad x \geq 0 \\ x^2 & , \quad x < 0 \end{cases}$, then f(x) is

A. continuous on R

B. discontinuous on R

C. continuous on R except at x =0

D. discontinuous on R except at x = 0

Answer: A

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30. If $f(x) = \frac{x+1}{(x-2)(x-5)}$, then in [0, 1]

A. continuous

B. discontinuous

C. continuous except at x = 0

D. discontinuous except at x = 0

Answer: A

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31. Function $f(x) = \begin{cases} x - 1, & x < 2 \\ 2x - 3, & x \geq 2 \end{cases}$ is a continuous function

A. For all real values of x

B. only for x = 2

C. for all real values of x when $x \neq 2$

D. none of these

Answer: A

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32. If $f(x) = \begin{cases} 3x - 4 & , \quad 0 \leq x \leq 2 \\ 2x + k & , \quad 2 < x \leq 3 \end{cases}$ is continuous in [0,3], then the value of k is

A. -1

B. -2

C. -3

D. -4

Answer: B

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33. If f(x) is continuous in [-2,2], where

$$f(x) = \begin{cases} x + a & , \quad x < 0 \\ x & , \quad 0 \leq x < 1 \\ b - x & , \quad x \geq 1 \end{cases}, \text{ then}$$

A. a = 0, b = 2

B. a = 1, b = 2

C. a = 0, b = -2

D. a = -1, b = 2

Answer: A

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34. If f (x) is continuous on $0 - 4, 2]$, defined as

$f(x) = 6b - 3ax$, for $-4 \leq x < -2$

$= 4x + 1, \quad \text{for} -2 \leq x \leq 2,$

find the value of $a + b$.

A. $\frac{1}{6}$

B. $-\frac{1}{6}$

C. $\frac{7}{6}$

D. $-\frac{7}{6}$

Answer: D

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Critical Thinking

1. If $f(x) = \frac{x^2 - 10x + 25}{x^2 - 7x + 10}$ for $x \neq 5$ is continuous at $x = 5$ then $f(5) =$

A. 0

B. 5

C. 10

D. 25

Answer: A

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2. If $f(x) = \begin{cases} \frac{x^6 - \frac{1}{64}}{x^3 - \frac{1}{8}} & , \quad x \neq \frac{1}{2} \\ k & , \quad x = \frac{1}{2} \end{cases}$ is continuous at $x = \frac{1}{2}$, then the value of k is

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{5}$

Answer: C

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3. If $f(x) = \begin{cases} \sin^{-1}|x| & , \text{when} x \neq 0 \\ 0 & , \text{when} x = 0 \end{cases}$, then

A. $\lim_{x \to 0^+} f(x) \neq 0$

B. $\lim_{x \to 0^-} f(x) \neq 0$

C. f(x) is continuous at $x = 0$

D. f(x) is not continuous at $x = 0$

Answer: C

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4. The function $f(x) = x^2 \sin \frac{1}{x}, x \neq 0, (f)0 = 0$ at x=0

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5. If $f(x) = \begin{cases} x^k \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$ is continuous at x = 0, then

A. $a < 0$

B. $a > 0$

C. $a > 1$

D. $a < 1$

Answer: B

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6. If $f(x) = \begin{cases} \frac{x}{e^{\frac{1}{x}}+1} & , \text{when} x \neq 0 \\ 0 & , \text{when} x = 0 \end{cases}$, then

A. $\lim_{x \to 0^+} f(x) = 1$

B. $\lim_{x \to 0^-} f(x) = 1$

C. f(x) is continuous at $x = 0$

D. f(x) is discontinuous at $x = 0$

Answer: C

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7. Which of the following functions is continuous at x = 0 ?

A. $f(x) = \begin{cases} \frac{\sin 2x}{x} & , x \neq 0 \\ 1 & , x = 0 \end{cases}$

B. $f(x) = \begin{cases} (1+x)^{\frac{1}{x}} & , x \neq 0 \\ 1 & , x = 0 \end{cases}$

C. $f(x) = \begin{cases} e^{\frac{1}{x}} & , \quad x \neq 0 \\ 1 & , \quad x = 0 \end{cases}$

D. $f(x) = \begin{cases} \frac{3x + 4\tan x}{x} & , \quad x \neq 0 \\ 7 & , \quad x = 0 \end{cases}$

Answer: D

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8. Let $f(x) = \begin{cases} 5^{1/x}, & x < 0 \\ \lambda[x], & x \geq 0 \end{cases}$ and $\lambda \in R$, then at x = 0

A. f is continuous whatever λ may be

B. f is discontinuous

C. f is continuous only if $\lambda = 0$

D. none of these

Answer: A

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9. If $f(x) = \frac{x - a}{\sqrt{x} - \sqrt{a}}, x \neq a$, is continuous at x = a then f(a) is equal to

A. $\sqrt{a}$

B. $2\sqrt{a}$

C. a

D. $2a$

Answer: B

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10. If $f(x) = \frac{\sqrt{x + 3} - 2}{x^3 - 1}, x \neq 1$, is continuous at x = 1, then f(1) is

A. 12

B. $\frac{1}{8}$

C. $\frac{1}{12}$

D. 8

Answer: C

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11. If $f(x) = \begin{cases} \frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & , \text{for} -1 \leq x < 0 \\ 2x^2 + 3x - 2 & , \text{for} 0 \leq x \leq 1 \end{cases}$ is continuous at x=0 then find k

A. -4

B. -3

C. -2

D. -1

Answer: C

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12. If $f(x) = \begin{cases} \frac{x^4 - 64x}{\sqrt{x^2+9}-5} & , \quad x \neq 4 \\ k & , \quad x = 4 \end{cases}$ is continous at x = 4, then k =

A. 60

B. 120

C. 180

D. 240

Answer: D

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13. If $f(x) = \frac{\tan(x^2 - x)}{x}, x \neq 0$, is continuous at x = 0, then f(0)is

A. -1

B. 0

C. 1

D. 2

Answer: A

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14. Function $f(x) = (1 - \cos 4x) / (8x^2), \quad \text{where} \quad x \neq 0$, and f(x) = k, where x = 0 , is a continuous function at x = 0 Then : k =

A. 0

B. 1

C. -1

D. none of these

Answer: B

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15. Let $f(x) = \begin{cases} \frac{1-\cos 4x}{x^2}, & x < 0 \\ a, & x = 0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4}, & x > 0 \end{cases}$ Then, the value of a if possible, so that the function is continuous at x = 0, is.....

A. 8

B. -8

C. 4

D. 16

Answer: A

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16. $f(x) = \frac{1-\cos 3x}{x \tan x}$, for $x \neq 0$

$= k$, for $x = 0$

If f(x) is continuous at x = 0, the value of k is

A. $\frac{3}{2}$

B. $\frac{5}{2}$

C. $\frac{7}{2}$

D. $\frac{9}{2}$

Answer: D

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17. For what value of k, function $f(x) = \begin{cases} \frac{k\cos x}{\pi - 2x}, & \text{if } x \neq \frac{\pi}{2} \\ 3, & \text{if } x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$?

A. 3

B. 6

C. 9

D. 12

Answer: B

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18. If $f(x) = \frac{\cos x - \sin x}{\cos 2x}, \quad x \neq \frac{\pi}{4}$
$= k, \quad x = \frac{\pi}{4}$ is continous at $x = \frac{\pi}{4}$, then the value of k is

A. $\sqrt{2}$

B. $\frac{1}{\sqrt{2}}$

C. $2\sqrt{2}$

D. $\frac{1}{2\sqrt{2}}$

Answer: B

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19. $f: R \to R$ is defined by $f(x) = \begin{cases} \frac{\cos 3x - \cos x}{x^2}, x \neq 0\lambda, x = 0 \end{cases}$ and f is continuous at $x = 0;$ then $\lambda =$

A. -2

B. -4

C. -6

D. -8

Answer: B

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20. If $f(x)$ is continuous at $x = \frac{\pi}{4}$, where $f(x) = \frac{1 - \tan x}{1 - \sqrt{2}\sin x}$, for $x \neq \frac{\pi}{4}$, then $f\left(\frac{\pi}{4}\right) =$

A. 2

B. $2\sqrt{2}$

C. 4

D. $4\sqrt{2}$

Answer: A

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21. If $f(x) = \begin{cases} \frac{3\sin x - \sqrt{3}\cos x}{6x - \pi} & , \quad x \neq \frac{\pi}{6} \\ a & , \quad x = \frac{\pi}{6} \end{cases}$

is continuous at $x = \frac{\pi}{6}$, then a =

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $-\sqrt{3}$

D. $-\frac{1}{\sqrt{3}}$

Answer: B

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22. If $f(x) = \frac{1 - \sin x}{(\pi - 2x)^2}, when x \neq \frac{\pi}{2} and f\left(\frac{\pi}{2}\right) = \lambda,$ the $f(x)$ will be continuous function at $x = \frac{\pi}{2}, where \lambda = \frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) none of these

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. none of these

Answer: A

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23. If $f(x) = \frac{(a + x)^2 \sin(a + x) - a^2 \sin a}{x}, x \neq 0,$ then the value of f(0) so that f is continuous at x = 0 is

A. $a^2 \cos a + a \sin a$

B. $a^2 \cos a + 2a \sin a$

C. $2a^2 \cos a + a \sin a$

D. $2a^2 \cos a + 2a \sin a$

Answer: B

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24. If the function $f(x) = \frac{2 - \sqrt{x+4}}{\sin 2x} (x \neq 0)$ is continuous at x = 0, then f(0) is equal to -

A. $\frac{1}{4}$

B. $-\frac{1}{4}$

C. $\frac{1}{8}$

D. $-\frac{1}{8}$

Answer: D

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25. The value of $f(0)$, so that the function $f(x) = \frac{(27-2x)^2 - 3}{9 - 3(243+5x)^{1/5} - 2}(x \neq 0)$ is continuous, is given $\frac{2}{3}$ (b) 6 (c) 2 (d) 4

A. $\frac{2}{3}$

B. 6

C. 2

D. 4

Answer: C

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26. If $f(x)$ is continuous at $x = \frac{\pi}{2}$, where $f(x) = \frac{\sqrt{2} - \sqrt{1 + \sin x}}{\cos^2 x}$, for $x \neq \frac{\pi}{2}$, then $f\left(\frac{\pi}{2}\right) =$

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{2\sqrt{2}}$

C. $\frac{1}{3\sqrt{2}}$

D. $\frac{1}{4\sqrt{2}}$

Answer: D

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27. If $f(x) = \frac{(1+\sin x) - \sqrt{1-\sin x}}{x}, x \neq 0,$ is continuous at x = 0, then f(0) is

A. 1

B. 2

C. -2

D. $\frac{1}{2}$

Answer: A

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28. If the function $f(x) = \frac{\cos^2 x - \sin^2 x - 1}{\sqrt{x^2+1}-1}, x \neq 0,$ is continuous at x = 0, then f(0) is equal to

A. -2

B. -1

C. 0

D. -4

Answer: D

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29. The value of f at x =0 so that funcation $f(x) = \frac{2^x - 2^{-x}}{x}, x \neq 0$ is continuous at x =0 is

A. log 2

B. 4

C. e^4

D. log 4

Answer: D

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30. If $f(x) = \frac{3^x + 3^{-x} - 2}{x^2}$ for $x \neq 0$ is continuous at x = 0, iff f(0) is equal to

A. log 3

B. $(\log 3)^2$

C. $\log\left(\frac{1}{3}\right)$

D. e^3

Answer: B

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31. If f(x) is continuous at x = 0, where

$$f(x) = \frac{8^x - 2^x}{k^x - 1}, \text{ for } x \neq 0$$
$$= k, \text{ for } x = 0$$

, then k is equal to

A. 2

B. -2

C. 4

D. -4

Answer: A

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32. If $f(x)$ is continuous at $x = 0$, where $f(x) = \frac{\left(e^{3x} - 1\right)\sin x^{\circ}}{x^2}$, for $x \neq 0$, then $f(0) =$

A. $\frac{\pi}{30}$

B. $\frac{\pi}{45}$

C. $\frac{\pi}{60}$

D. $\frac{\pi}{90}$

Answer: C

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33. If $f(x) = \frac{e^{5x} - e^{2x}}{\sin 3x}, \quad x \neq 0$

$= \frac{k}{2}, \quad x = 0$

is continuous at x = 0, the value of k is

A. 0

B. 1

C. 2

D. 5

Answer: C

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34. If $f(x) = \frac{e^x - e^{\sin x}}{2(x \sin x)}, x \neq 0$ is continuous at x = 0, then f(0) =

A. 0

B. 1

C. $\frac{1}{2}$

D. 2

Answer: C

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35. In order that the function $f(x) = (x+1)^{\cot x}$ is continuous at x = 0, f(0) must be defined as

A. $f(0) = \frac{1}{e}$

B. $f(0) = 0$

C. $f(0) = e$

D. $f(0) = e^2$

Answer: C

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36. If $f(x) = \left(\frac{4x+1}{1-4x}\right)^{\frac{1}{x}}, \quad x \neq 0$

$= k, \quad x = 0$

is continuous at x = 0, then k =

A. e^2

B. e^4

C. e^6

D. e^8

Answer: D

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37. If $f(x) = \left(\sec^2 x\right)^{\cot^2 x}, \quad x \neq 0$

$= k, \quad x = 0$

is continuous at x = 0 , then k is equal to

A. 0

B. 1

C. e

D. e^2

Answer: C

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38. If $f(x)$ is continuous at $x = \frac{\pi}{2}$, where $f(x) = (\sin x)^{\frac{1}{\pi - 2x}}$, $for x \neq \frac{\pi}{2}$, then $f\left(\frac{\pi}{2}\right)$ =

A. e

B. e^2

C. 1

D. 0

Answer: C

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39. $f(x) = \frac{\log(1+kx)}{\sin x}, \quad x \neq 0$

$= 5, \quad x = 0$

If f is continuous at x = 0, then k =

A. 1

B. 3

C. 5

D. 7

Answer: C

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40. If $f(x) = \frac{\log x - \log 7}{x-7}, \quad x \neq 7$

$= k, \quad x = 7$

is continuous at $x = 7$, then the value of k is

A. $\frac{1}{3}$

B. $\frac{1}{5}$

C. $\frac{1}{7}$

D. $\frac{1}{9}$

Answer: C

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41. If $f(x) = \begin{cases} \frac{\log(1+2ax) - \log(1-bx)}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x = 0, then k is equal to

A. $2a + b$

B. $2a - b$

C. $b - 2a$

D. $a + b$

Answer: A

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42. $f(x) = \frac{\left(3^{\sin x} - 1\right)^2}{x \log(1+x)}, \quad x \neq 0$

$= k, \quad x = 0$

if f is continouous at x = 0, then k =

A. $\frac{1}{2}\log 3$

B. log 3

C. 2 log 3

D. $(\log 3)^2$

Answer: D

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43. The value of f(0) so that the function $f(x) = \frac{\log(\sec^2 x)}{x \sin x}, x \neq 0$, is continuous at x = 0 is

A. 0

B. 1

C. -1

D. e

Answer: B

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44. The value of a for which the function $f(x) = f(x) = \begin{cases} \frac{(4^x - 1)\hat{3}}{\sin(xa)\log\{(1 + x^2 3)\}}, x \neq 012(\log 4)^3, x = 0 \end{cases}$

may be continuous at $x = 0$ is 1 (b) 2 (c) 3 (d) none of these

A. 1

B. 2

C. 3

D. 4

Answer: D

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45. $f(x) = \begin{cases} \frac{x^2-9}{x-3} + a & , \quad x > 3 \\ 5 & , \quad x = 3 \\ 2x^2 + 3x + b & , \quad x < 3 \end{cases}$

is continuous at x = 3, then

A. $a = 1, b = -22$

B. $a = 1, b = 22$

C. $a = -1, b = 22$

D. $a = -1, b = -22$

Answer: D

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46. If $f(x)$ is continuous at x = 0 , where $f(x) = \begin{cases} x^2 + a & , \quad x \geq 0 \\ 2\sqrt{x^2+1} + b & , \quad x < 0 \end{cases}$ and $f\left(\frac{1}{2}\right) = 2$, then the value of a and b are respectively

A. $\frac{7}{4}, \frac{1}{4}$

B. $\frac{7}{4}, -\frac{1}{4}$

C. $\frac{-1}{4}, \frac{7}{4}$

D. $-\frac{7}{4}, -\frac{1}{4}$

Answer: B

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47. Find the values of a and b sucht that the function f defined by

$$fx = \begin{cases} \frac{x-4}{|x-4|} + a & \text{if } x < 4 \\ a + b & \text{if } x = 4 \\ \frac{x-4}{|x-4|} + b & \text{if } x > 4 \end{cases}$$

is a continous function at $x = 4$.

A. $a = 0, b = 0$

B. $a = 1, b = 1$

C. $a = -1, b = 1$

D. $a = 1, b = -1$

Answer: D

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48. The value of p and q for which the function

$$f(x) = \begin{cases} \frac{\sin(p+1)x + \sin x}{x} & , \quad x < 0 \\ q & , \quad x = 0 \\ \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{1/2}} & , \quad x > 0 \end{cases}$$

is continuous for all x in R, are

A. $a = -2, b = 0, c \neq 0$

B. $a = -2, b \neq 0, c = 0$

C. $a = 2, b = 0, c \neq 0$

D. $a = 2, b \neq 0, c = 0$

Answer: B

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49. If $f(x) = \begin{cases} e^{\frac{1}{x}} & , \text{when} x \neq 0 \\ 1 & , \text{when} x = 0 \end{cases}$, then

A. $\lim_{x \to 0^+} f(x) = e$

B. $\lim_{x \to 0^+} f(x) = 0$

C. f(x) is discontinuous at $x = 0$

D. f(x) is continuous at $x = 0$

Answer: C

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50. If $f(x) = \begin{cases} \frac{x^4 - 16}{x - 2} & , \text{when} x \neq 2 \\ 16 & , \text{when} x = 2 \end{cases}$, then

A. f(x) is continuous at $x = 2$

B. f(x) is discontinuous at $x = 2$

C. $\lim_{x \to 2} f(x) = 16$

D. none of these

Answer: B

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51. The function $f(x) = \frac{|3x - 4|}{3x - 4}$ is discontinuous at

A. x = 4

B. $x = \frac{3}{4}$

C. $x = \frac{4}{3}$

D. $x = \frac{2}{3}$

Answer: C

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52. If $f(x) = \begin{cases} |x| & , \quad x < 0 \\ x & , \quad 0 \leq x \leq 1 \\ 1 & , \quad x > 1 \end{cases}$, then f(x) is discontinuous at

A. x = 0

B. x = 1

C. x = 0 and x = 1

D. none of these

Answer: D

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53. If $f(x) = \frac{|x|}{x}, \text{ for } x \neq 0$
$= 1, \text{ for } x = 0$, then f(x) is

A. continuous at x = 0

B. discontinuous at x = 0

C. $\lim_{x \to 0^-} f(x) = 1$

D. $\lim_{x \to 0^+} f(x) = -1$

Answer: B

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54. The function $\frac{\sin x}{|x|}$

A. is continuous at x = 0

B. is discontinuous at x = 0

C. has removable discontinuity at x = 0

D. none of these

Answer: B

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55. If $f(x) = \begin{cases} \frac{x - |x|}{x} & , \text{when} x \neq 0 \\ 2 & , \text{when} x = 0 \end{cases}$, then

A. f(x) is continuous at x = 0

B. f(x) is discontinuous at x = 0

C. $\lim_{x \to 0} f(x) = 2$

D. $\lim_{x \to 0^-} f(x) = \lim_{x \to 0^+} f(x)$

Answer: B

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56. Select the write the most appropriate answer from the given alternatives in each of the following :

The function $f(x) = \frac{|x|}{x^2 + 2x}, x \neq 0$ and $f(0) = 0$ is not continuous at $x = 0$ because

A. $\lim_{x \to 0} f(x) \neq f(0)$

B. $\lim_{x \to 0^+} f(x)$ does not exist

C. $\lim_{x \to 0^-} f(x)$ does not exist

D. $\lim_{x \to 0} f(x)$ does not exist

Answer: D

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57. The function $f(x) = \begin{cases} \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1} & x \neq 0 \\ 0 & x = 0 \end{cases}$

A. $\lim_{x \to 0^+} f(x) = -1$

B. f(x) is continuous at $x = 0$

C. $\lim_{x \to 0^-} f(x) = 1$

D. f(x) is not continuous at $x = 0$

Answer: D

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58. $f(x) = \frac{x^2 + x - 2}{x^2 - 3x + 2}$ is discontinuous at x =

A. 0,1

B. 1,2

C. $-1, -2$

D. $0, -1$

Answer: B

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59. The point at which the function $f(x) = \frac{x+1}{x^2+x-12}$ is discontinuous are

A. $-3, 4$

B. $3, -4$

C. $3, 4$

D. $-3, -4$

Answer: B

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60. The function $f(x) = \frac{4 - x^2}{4x - x^3}$ is

A. discontinuous at only one point

B. discontinuous exactly at two points

C. discontinuous exactly at three points

D. none of these

Answer: C

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61. If $f(x) = \begin{cases} 4 - 3x & , \quad 0 < x \leq 2 \\ 2x - 6 & , \quad 2 < x \leq 3 \\ x + 5 & , \quad 3 < x \leq 6 \end{cases}$, then f(x) is

A. continuous at x = 2 and discontinuous at x = 3

B. continuous at x = 3 and discontinuous at x = 2

C. continuous at x = 2 and x = 3

D. discontinuous at x = 2 and x = 3

Answer: A

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62. If $f(x) = \begin{cases} x \sin x, \text{ for } 0 < x \leq \frac{\pi}{2} \\ \frac{\pi}{2}\sin(\pi + x), \text{ for } \frac{\pi}{2} < x < \pi \end{cases}$, then

A. f(x) is discontinous at $x = \frac{\pi}{2}$

B. f(x) is continous at $x = \frac{\pi}{2}$

C. f(x) is continous at $x = 0$

D. none of these

Answer: A

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63. If $f(y) = \begin{cases} \frac{\left(e^{2y}-1\right)\cdot \sin y}{y^2} & , \text{ for } y \neq 0 \\ 4 & , \text{ for } y = 0 \end{cases}$, then f(y) is

A. f(y) is discontinuous at $y = 0$

B. f(y) is continuous at $y = 0$

C. $\lim_{y \to 0} f(y)$ does not exist

D. none of these

Answer: A

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64. For the function $f(x) = \begin{cases} \frac{\sin^2 ax}{x^2}, & \text{where } x \neq 0 \\ 1, & \text{when } x = 0 \end{cases}$ which one is a true statement

A. f(x) is continuous at x = 0, when $a \neq \pm 1$

B. f(x) is discontinuous at x = 0, when $a \neq \pm 1$

C. $\lim_{x \to 0} f(x) = a$

D. $\lim_{x \to 0} f(x) = a^3$

Answer: B

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65. The points of discontinuity of tan x are

A. $n\pi, n \in I$

B. $2n\pi, n \in I$

C. $(2n+1)\frac{\pi}{2}, n \in I$

D. none of these

Answer: C

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66. If $f(x) = \begin{cases} \frac{\sin 2x}{\sqrt{1-\cos 2x}}, \text{for } 0 < x < \frac{\pi}{2} \\ \frac{\cos x}{\pi - 2x}, \text{for } \frac{\pi}{2} < x < \pi \end{cases}$, then

A. $\lim_{x \to \frac{\pi^-}{2}} f(x) = 1$

B. $\lim_{x \to \frac{\pi^+}{2}} f(x) = 1$

C. f(x) is continuous at $x = \frac{\pi}{2}$

D. f(x) is discontinuous at $x = \frac{\pi}{2}$

Answer: D

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67. If $f(x) = \begin{cases} \frac{x\cos x - 3\tan x}{x^2 + 2\sin x} & , \quad x \neq 0 \\ 1 & , \quad x = 0 \end{cases}$, then

A. f(x) is discontinuous at $x = 0$

B. f(x) is continuous at $x = 0$

C. $\lim_{x \to 0} f(x)$ does not exist

D. none of these

Answer: A

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68. If $f(x) = \begin{cases} \frac{5^x - e^x}{\sin 2x} & , \quad x \neq 0 \\ \frac{1}{2}(\log 5 + 1) & , \quad x = 0 \end{cases}$, then

A. f(x) is continuous at $x = 0$

B. f(x) is discontinuous at $x = 0$

C. $\lim_{x \to 0} f(x)$ does not exist

D. none of these

Answer: B

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69. $f(x) = \begin{cases} \frac{5^{\cos x} - 1}{\frac{\pi}{2} - x}, & x \neq \frac{\pi}{2} \\ \log 5, & x = \frac{\pi}{2} \end{cases}$ at $x = \frac{\pi}{2}$ is

A. f(x) is continuous at $x = \frac{\pi}{2}$

B. f(x) has removable discontinuity at $x = \frac{\pi}{2}$

C. f(x) has irremovable discontinuity at $x = \frac{\pi}{2}$

D. none of these

Answer: B

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70. If f(x) $= \frac{(2^x - 1)^2}{\sin x . \log(1+x)}, \quad \text{if} \quad x \neq 0$
$= 2\log 2, \quad \text{if} \quad x = 0$ then , at x = 0 the function f is

A. f(x) is continuous at $x = 0$

B. f(x) has removable discontinuity at $x = 0$

C. f(x) has irremovable discontinuity at $x = 0$

D. none of these

Answer: B

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71. If $f(x) = \frac{\tan\left(\frac{\pi}{4} - x\right)}{\cot 2x}, x \neq \frac{\pi}{4}$, is continuous in $\left(0, \frac{\pi}{2}\right)$, then $f\left(\frac{\pi}{4}\right)$ is equal to

A. 1

B. -1

C. $\frac{1}{2}$

D. 2

Answer: C

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72. If $f(x) = \begin{cases} \frac{\sqrt{1+px}-\sqrt{1-px}}{x}, & -1 \leq x < 0 \\ \frac{2x+1}{x-2}, & 0 \leq x \leq 1 \end{cases}$ is continuous in [-1,1] then p is equal to

A. -1

B. $\frac{-1}{2}$

C. $\frac{1}{2}$

D. 1

Answer: B

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73. The function $f(x) = \frac{x^2-4}{\sin x - 2}$ is

A. continuous for all real values of x

B. discontinuous when x = 2

C. discontinuous when sin x = 2

D. none of these

Answer: A

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74. If $f(x)$ is continuous on [0, 8] , where

$$f(x) = \begin{cases} x^2 + ax + 6, \text{ for } 0 \leq x < 2 \\ 3x + 2, \text{ for } 2 \leq x \leq 4 \\ 2ax + 5b, \text{ for } 4 < x \leq 8 \end{cases}, \text{ then}$$

A. $a = 1, b = \frac{22}{5}$

B. $a = -1, b = \frac{22}{5}$

C. $a = 1, b = \frac{-22}{5}$

D. $a = -1, b = \frac{-22}{5}$

Answer: B

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75. If f(x) is continuous in [-2,2], where

$$f(x)=\begin{cases}\frac{\sin ax}{x}-2 & , \text{ for} -2\leq x<0\\ 2x+1 & , \text{ for} 0\leq x\leq 1\\ 2b\sqrt{x^2+3}-1 & , \text{ for} 1<x\leq 2\end{cases}$$, then the value of $(a+b)$ is

A. 2

B. 4

C. 6

D. 8

Answer: B

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76. The value of a and b such that the function defined by

$$f(x) = \begin{cases} 7 & , \text{ if} x \leq 2 \\ ax + b & , \text{ if} 2 < x < 9 \\ 21 & , \text{ if} x \geq 9 \end{cases}$$, is continuous on its domain are

A. $a = 3, b = 2$

B. $a = 2, b = 3$

C. $a = 7, b = 9$

D. none of these

Answer: B

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77. If $f(x) = \frac{e^x + e^{-x} - 2}{x \sin x}$, for $x \in \left[\frac{-\pi}{2}, \frac{\pi}{2}\right] - \{0\}$, then for f to be continuous in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$, $f(0) =$

A. 0

B. 1

C. e

D. e^2

Answer: B

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78. Discuss the continuity of $f(x) = \left\{\frac{x^4 - 5x^2 + 4}{|(x-1)(x-2)}, x \neq 1, 26, x = 112, x = 2\right.$

A. R

B. $R - \{1\}$

C. $R - \{2\}$

D. $R - \{1, 2\}$

Answer: D

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79. The values of a and b so that the function

$$f(x) = \begin{cases} x + a\sqrt{2}\sin x, & 0 \leq x < \pi/4 \\ 2x\cot x + b, & \pi/4 \leq x \leq \pi/2 \\ a\cos 2x - b\sin x, & \pi/2 < x \leq \pi \end{cases}$$ is continuous

for $x \in [0, \pi]$, are

A. $a = \frac{\pi}{6}, b = \frac{\pi}{12}$

B. $a = -\frac{\pi}{6}, b = \frac{\pi}{12}$

C. $a = \frac{\pi}{6}, b = -\frac{\pi}{12}$

D. $a = -\frac{\pi}{6}, b = -\frac{\pi}{12}$

Answer: C

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80. If the function

$$f(x) = \begin{cases} 1 + (\sin)\frac{\pi x}{2} & , \text{for} -\infty < x \leq 1 \\ ax + b & , \text{for} 1 < x < 3 \\ 6(\tan)\frac{\pi x}{12} & , \text{for} 3 \leq x < 6 \end{cases}$$

is continuous in the interval $(-\infty, 6)$, then the value of a and b are respectively

A. 0,2

B. 1,1

C. 2,0

D. 2,1

Answer: C

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Competitive Thinking

1. If $f(x) = \begin{cases} kx^2 & \text{if} x \leq 2 \\ 3 & \text{if} x > 2 \end{cases}$ is continuous at x = 2, then the value of k is

A. 3

B. 4

C. $\frac{3}{4}$

D. $\frac{4}{3}$

Answer: C

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2. For the function $f(x) = \begin{cases} \frac{x^3 - a^3}{x - a}, & x \neq a \\ b, & x = a \end{cases}$, if f(x) is continuous at x = a, then b is equal to

A. a^2

B. $2a^2$

C. $3a^2$

D. $4a^2$

Answer: C

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3. The function 'f' is defined by $f(x) = 2x - 1$, if $x > 2$, $f(x) = k$ if $x = 2$ and $x^2 - 1$ if $x < 2$ is continuous,

then the value of k is equal to

A. 2

B. 3

C. 4

D. -3

Answer: B

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4. $f(x) = \begin{cases} 3x - 8 & , \text{if} x \leq 5 \\ 2k & , \text{if} x > 5 \end{cases}$ is continuous at x = 5, find k.

A. $\frac{4}{7}$

B. $\frac{2}{7}$

C. $\frac{7}{2}$

D. $\frac{3}{7}$

Answer: C

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5. If $f(x) = x^2 + \alpha \quad , \quad \text{for} x \geq 0$
$= 2\sqrt{x^2+1} + \beta \quad , \quad \text{for} x < 0$
is continuous at x = 0 and $f\left(\frac{1}{2}\right) = 2$ then $\alpha^2 + \beta^2$ is

A. 3

B. $\frac{8}{25}$

C. $\frac{25}{8}$

D. $\frac{1}{3}$

Answer: C

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6. In order that the function $f(x) = (x+1)^{\frac{1}{x}}$ is continuous at x = 0, f(0) must be defined as

A. $f(0) = 0$

B. $f(0) = e$

C. $f(0) = \frac{1}{e}$

D. $f(0) = 1$

Answer: B

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7. If $f(x) = \begin{cases} \frac{x^2+3x-10}{x^2+2x-15} & , \text{when} x \neq -5 \\ a & , \text{when} x = -5 \end{cases}$

is continuous at x = -5, then the value of 'a' will be

A. $\frac{3}{2}$

B. $\frac{7}{8}$

C. $\frac{8}{7}$

D. $\frac{2}{3}$

Answer: B

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8. If $f(x) = \begin{cases} \frac{x^2-9}{x-3} & , \text{if} x \neq 3 \\ 2x + k & , \text{otherwise} \end{cases}$, is continuous at x = 3, then k =

A. 3

B. 0

C. -6

D. $\frac{1}{6}$

Answer: B

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9. If $f(x) = \begin{cases} \frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & \text{if} -1 \leq x < 0 \\ \frac{2x+k}{x-1} & \text{if} 0 \leq x \leq 1 \end{cases}$

is continuous at x = 0, then the value of k is

A. k = 1

B. k = -1

C. k = 0

D. k = 2

Answer: B

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10. If $f(x) = \begin{cases} \frac{\sin 2x}{5x} & , \text{when} x \neq 0 \\ k & , \text{when} x = 0 \end{cases}$ is continuous at x = 0, then the value of k will be

A. 1

B. $\frac{2}{5}$

C. $-\frac{2}{5}$

D. $\frac{5}{2}$

Answer: B

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11. If $f(x) = \begin{cases} \frac{3\sin \pi x}{5x} & , \quad x \neq 0 \\ 2k & , \quad x = 0 \end{cases}$ is continuous at x = 0, then the value of k is equal to

A. $\frac{3\pi}{10}$

B. $\frac{3\pi}{5}$

C. $\frac{\pi}{10}$

D. $\frac{3\pi}{10}$

Answer: A

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12. If $f(x) = |x - 2|$, then

A. $\lim_{x \to 2^+} f(x) \neq 0$

B. $\lim_{x \to 2^-} f(x) \neq 0$

C. $\lim_{x \to 2^+} f(x) \neq \lim_{x \to 2^-} f(x)$

D. f(x) is continuous at x = 2

Answer: D

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13. If $f(x) = |x - b|$, then the function

A. is differential at x = b

B. is continuous at x = b

C. is discontinuous at x = b

D. none of these

Answer: B

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14. If $f(x) = \begin{cases} 1 & , \text{ when} 0 < x \leq \frac{3\pi}{4} \\ 2(\sin)\frac{2}{9}x & , \text{ when} \frac{3\pi}{4} < x < \pi \end{cases}$, then

A. f(x) is continuous at x = 0

B. f(x) is continuous at $x = \pi$

C. f(x) is continuous at $x = \frac{3\pi}{4}$

D. f(x) is discontinuous at $x = \frac{3\pi}{4}$

Answer: C

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15. If $f(x) = \begin{cases} \frac{1-\cos x}{x} & , \quad x \neq 0 \\ k & , \quad x = 0 \end{cases}$ is continuous at x = 0 then k =

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. $-\frac{1}{2}$

Answer: A

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16. If the function $f(x) = \begin{cases} (\cos x)^{\frac{1}{x}} & , \quad x \neq 1 \\ k & , \quad x = 1 \end{cases}$ is continuous at x = 1, then the value of k is

A. 1

B. -1

C. 0

D. e

Answer: A

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17. If $f(x) = \begin{cases} \frac{\log_e x}{x-1} & , \quad x \neq 1 \\ k & , \quad x = 1 \end{cases}$ is continuous at x = 1, then the value of k is

A. e

B. 1

C. -1

D. 0

Answer: B

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18. The function $f(x) = \dfrac{1 - \sin x + \cos x}{1 + \sin x + \cos x}$ is not defined at $x = \pi$. The value of $f(\pi)$, so that f(x) is continuous at $x = \pi$ is

A. $\dfrac{1}{2}$

B. $\dfrac{1}{2}$

C. -1

D. 1

Answer: C

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19. If $f(x) = \dfrac{\left(e^{kx} - 1\right)^2 \sin x}{x^3}, \quad x \neq 0$

$= 4, \quad x = 0$

is continuous at x = 0, then k =

A. 2

B. -2

C. ± 2

D. 3

Answer: C

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20. If $f(x) = \frac{e^{x^2} - \cos x}{x^2}$, $\text{for} x \neq 0$ is continuous at x = 0, then value of f(0) is

A. $\frac{2}{3}$

B. $\frac{5}{2}$

C. 1

D. $\frac{3}{2}$

Answer: D

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21. For what value of k, the function defined by

$$f(x) = \frac{\log(1+2x)\sin x^6}{x^3}, \quad \text{for} x \neq 0$$
$$= k, \quad \text{for} x = 0$$

is continuous at x = 0?

A. 2

B. $\frac{1}{2}$

C. $\frac{\pi}{90}$

D. $\frac{90}{\pi}$

Answer: C

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22. If $f(x) = \log_{1-3x}(1+3x), \quad x \neq 0$
$= k, \quad x = 0$

is continuous at x = 0, then the value of k is

A. -1

B. 1

C. 2

D. -2

Answer: A

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23. If $f(x) = (\log)\left(\sec^2 x\right)^{\cot^2 x}, \text{ for} x \neq 0$
$= k, \text{ for} x = 0$

is continuous at x = 0 then k is

A. e^{-1}

B. 1

C. e

D. 0

Answer: B

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24. If the function $f(x) = \left[\log\left(\frac{\pi}{4} + x\right)\right]^{\frac{1}{x}}, \text{ for} x \neq 0$
$= k, \text{ for} x = 0$

is continuous at x = 0, then k = ?

A. e

B. e^{-1}

C. e^{2}

D. e^{-2}

Answer: C

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25. Function $f(x) = \begin{cases} (\log_2 2x)^{\log_x 8} & , \quad x \neq 1 \\ (k-1)^3 & , \quad x = 1 \end{cases}$ is continuous at x = 1 , then k = _____.

A. $e + 1$

B. $e^{1/3}$

C. e^{3}

D. $e - 1$

Answer: A

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26. For the function $f(x) = \frac{\log_e(1+x) - \log_e(1-x)}{x}$ to be continuous at x = 0, the value of f(0) should be

A. -1

B. 0

C. -2

D. 2

Answer: D

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27. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at x = 0. The value which should be assigned to f at x = 0 so that it is continuous at x = 0, is

A. $a - b$

B. $a + b$

C. $\log a + \log b$

D. $\log a - \log b$

Answer: B

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28. If the function $f(x) = \begin{cases} \frac{x^2 - (A+2)x + A}{x-2} & , \quad x \neq 2 \\ 2 & , \quad \text{for} x = 2 \end{cases}$

is continuous at x = 2, then

A. A = 0

B. A = 1

C. A = -1

D. A = 2

Answer: A

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29. The value of k which makes

$f(x) = \begin{cases} \left(\sin\left(\frac{1}{x}\right)\right) & , \quad x \neq 0 \\ k & , \quad x = 2 \end{cases}$ continuous at x = 0 is

A. 8

B. 1

C. -1

D. none of these

Answer: D

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30. If the function f(x) defined by

$$f(x) = x(\sin)\frac{1}{x} \quad , \quad \text{for} x \neq 0$$
$$= k \quad , \quad \text{for} x = 0$$

is continuous at x = 0, then k =

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

Answer: A

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31. If $f(x) = \begin{cases} ax^2 - b & , \text{ when} 0 \leq x \leq 1 \\ 2 & , \text{ when} x = 1 \\ x + 1 & , \text{ when} 1 < x \leq 2 \end{cases}$ is continuous at x = 1, then the most suitable values of a, b are

A. $a = 2, b = 0$

B. $a = 1, b = -1$

C. $a = 4, b = 2$

D. All of the above

Answer: D

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32. If $f(x) = \begin{cases} \sin x & , \text{if} x \leq 0 \\ x^2 + a^2 & , \text{if} 0 < x < 1 \\ bx + 2 & , \text{if} 1 \leq x \leq 2 \\ 0 & , \text{if} x > 2 \end{cases}$ is continuous on R, then $a + b + ab =$

A. -2

B. 0

C. 2

D. -1

Answer: D

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33. If $f(x) = \begin{cases} \frac{1-\sin zx}{\pi-2x} & , \quad x \neq \frac{\pi}{2} \\ \lambda & , \quad x = \frac{\pi}{2} \end{cases}$, be continuous at $x = \frac{\pi}{2}$, then the value of λ is

A. -1

B. 1

C. 0

D. 2

Answer: C

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34. If a function of defined by $f(x) = \begin{cases} \frac{1-\sin zx}{\pi-2x} & , \quad \text{if} x \neq \frac{\pi}{4} \\ k & , \quad \text{if} x = \frac{\pi}{4} \end{cases}$ is continuous at $x = \frac{\pi}{4}$, then k =

A. $\frac{1}{4}$

B. 1

C. $-\frac{1}{4}$

D. 2

Answer: A

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35. Let $f(x) = \begin{cases} \frac{\tan x - \cot x}{x - \frac{\pi}{4}} & , \quad x \neq \frac{\pi}{4} \\ a & , \quad x = \frac{\pi}{4} \end{cases}$

The value of a so that f(x) is continuous at $x = \frac{\pi}{4}$, is

A. 2

B. 4

C. 3

D. 1

Answer: B

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36. if $f(x) = \frac{\sin[x]}{[x]+1}, x > 0$ and $f(x) = \frac{\cos\frac{\pi}{2}[x]}{[x]}, x < 0$ and $f(x) = k, x = 0$ where $[x]$ denotes the greatest integer less than or equal to x, then in order that the continuous at $x = 0$, the value of k is equal to

A. Equal to 0

B. Equal to 1

C. Equal to -1

D. Indeterminate

Answer: A

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37. The function defined by

$$f(x) = \begin{cases} \left(x^2 + e^{\frac{1}{2-x}}\right)^2 & , \quad x \neq 2 \\ k & , \quad x = 2 \end{cases}$$

, is continuous from right at the point x = 2, then k is equal to

A. 0

B. $\frac{1}{4}$

C. $-\frac{1}{4}$

D. 4

Answer: B

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38. If $f(x) = \frac{\log_e\left(1 + x^2 \tan x\right)}{\sin x^3}, x \neq 0$ is continuous at x = 0 then f(0) must be defined as

A. 1

B. 0

C. $\frac{1}{2}$

D. -1

Answer: A

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39. The function $f: R - \{0\} \to R$ given by $f(x) = \frac{1}{x} - \frac{2}{e^2 x - 1}$ can be made continuous at x=0 by defining f(0) as

A. 0

B. 1

C. 2

D. -1

Answer: B

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40. If $f(x) = \frac{20^x + 3^x - 6^x - 10^x}{1 - \cos 8x}$, for $x \neq 0$

$= \left(\frac{k}{16}\right) \log\left(\frac{10}{3}\right) \cdot \log 2$, for $x = 0$

is continuous at x = 0, then the value of k is

A. $\sin^2 30^\circ$

B. $3^{\log 3\left(\frac{1}{2}\right)}$

C. $\sqrt[3]{\frac{1}{4}}$

D. $\frac{\log_2 2}{3}$

Answer: B

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41. If $f(x) = \begin{cases} \frac{x-2}{|x-2|} + a & , \quad x < 2 \\ a + b & , \quad x = 2 \\ \frac{x-2}{|x-2|} + b & , \quad x > 2 \end{cases}$

is continuous at x = 2, then a+b =

A. 2

B. 1

C. 0

D. -1

Answer: C

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42. If $f(x) = |x| + |x - 1|$, then

A. f(x) is continuous at x = 0 only

B. f(x) is continuous at x = 1 only

C. f(x) is continuous at both x = 0 and x = 1

D. f(x) is discontinuous

Answer: C

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43. If $f(x) = \begin{cases} \frac{x^2-4x+3}{x^2-1} & , \text{for} x \neq 1 \\ 2 & , \text{for} x = 1 \end{cases}$, then

A. f(x) is continuous at x = 0

B. f(x) has removable discontinuity

C. f(x) has irremovable discontinuity

D. None of these

Answer: B

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44. If $f(x) = \begin{cases} \frac{|x-a|}{x-a} & , \text{when} x \neq a \\ 1 & , \text{when} x = a \end{cases}$, then

A. f(x) is continuous at x = a

B. f(x) is discontinuous at x = a

C. $\lim_{x \to a} f(x) = 1$

D. $\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x)$

Answer: B

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45. The function $f(x) = |x| = \frac{|x|}{x}$ is

A. Continuous at the origin

B. Discontinuous at the origin because $|x|$ is discoutinuos there

C. Discontinuous at the origin because $\frac{|x|}{x}$ is discoutinuos there

D. Discontinuous at the origin because both $|x|$ and $\frac{|x|}{x}$ is discoutinuos there

Answer: C

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46. The points of discontinuity of the function $f(x) = \frac{2x^2 + 7}{x^3 + 3x^2 - x - 3}$ are -

A. x = 1 only

B. x = 1 and x = -1 only

C. x = 1, x = -1, x = -3 only

D. x = 1, x = -1, x = -3 and other value of x

Answer: C

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47. If $f: R \to R$ is defined by

$$f(x) = \begin{cases} x - 1 & , \text{ for} x \leq 1 \\ 2 - x^2 & , \text{ for} 1 < x \leq 3 \\ x - 10 & , \text{ for} 3 < x < 5 \\ 2x & , \text{ for} x \geq 5 \end{cases}$$

then the set of points of discontinuity of f is

A. $R - \{1, 3, 5\}$

B. $\{1, 3, 5\}$

C. $R - \{1, 5\}$

D. $\left\{\frac{1}{5}\right\}$

Answer: D

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48. The number of points at which the function $f(x) = \frac{1}{\log|x|}$ is discontinuous are

A. 1

B. 2

C. 3

D. 4

Answer: C

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49. The number of discontinuities of the greatest interger function $f(x) = [x] \in \left(-\frac{7}{2}, 100 \right)$ is equal to

A. 104

B. 100

C. 102

D. 103

Answer: D

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50. If the function

$$f(x) = \begin{cases} 5x - 4 & , \text{if} 0 < x \leq 1 \\ 4x^2 + 3bx & , \text{if} 1 < x \leq 2 \end{cases}$$ is continuous at every point of its domain, then the value of b is

A. -1

B. 0

C. 1

D. none of these

Answer: A

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51. Let $f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2}, & \text{if} x \neq 2 \\ k, & \text{if} x = 2 \end{cases}$. If f(x) is continuous for all x, then k =

A. 7

B. -7

C. ± 7

D. none of these

Answer: A

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52. The function $f(x) = \frac{\sin(x)}{[x]}$, where $[x]$ the greatest function at x=0 f(x) has

A. Continuity

B. Irremovable discontinuity

C. Removable discontinuity

D. Cant say

Answer: B

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53. The function $f(x) = \sin\{x\}$ is where {.} is fractional part function

A. Continuous for all x

B. has removable discontinuity

C. has irremovable discontinuity

D. none of these

Answer: C

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54. Let $f(x) = \frac{1 - \tan x}{4x - \pi}, x \neq \frac{\pi}{4}, x \in \left[0, \frac{\pi}{2}\right]$. If f(x) is continuous in $\left[0, \frac{\pi}{2}\right]$, then $f\left(\frac{\pi}{4}\right)$ is

A. -1

B. $\frac{1}{2}$

C. $-\frac{1}{2}$

D. 1

Answer: C

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55. If the function $f9x\Big) = \dfrac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$ is continuous at each point of its domain, then the value of $f(0)$ 2 (b) $\dfrac{1}{3}$ (c) $-\dfrac{1}{3}$ (d) $\dfrac{2}{3}$

A. 2

B. $\dfrac{1}{3}$

C. $\dfrac{2}{3}$

D. $-\dfrac{1}{3}$

Answer: B

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56. The function $f(x) = \begin{cases} x+2 & , \ 1 \leq x < 2 \\ 4 & , \ x = 2 \\ 3x-2 & , \ x > 2 \end{cases}$ is continuous at

A. $x = 2$ only

B. $x \leq 2$

C. $x \geq 2$

D. none of these

Answer: C

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57. The value(s) of x for which the function

$$f(x) = \begin{cases} 1-x & , \quad x < 1 \\ (1-x)(2-x) & , \quad 1 \leq x \leq 2 \\ 3-x & , \quad x > 2 \end{cases}$$

fails to be continuous is (are)

A. 1

B. 2

C. 3

D. All real numbers

Answer: B

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58. If f(x) is continuous over $[-\pi, \pi]$, where f(x) is defined as

$$f(x) = \begin{cases} -2\sin x & , \quad -\pi \leq x \leq \frac{-\pi}{2} \\ \alpha \sin x + \beta & , \quad -\frac{\pi}{2} < x < \frac{\pi}{2} \\ \cos x & , \quad \frac{\pi}{2} \leq x < \pi \end{cases}$$

then α and β equals

A. $\alpha = -1, \beta = 1$

B. $\alpha = 1, \beta = -1$

C. $\alpha = 1, \beta = 1$

D. $\alpha = \beta = 0$

Answer: A

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59. Let $f(x) = \begin{cases} -2\sin x & , \text{ if} x \leq -\frac{\pi}{2} \\ A\sin x + B & , \text{ if} -\frac{\pi}{2} < x < \frac{\pi}{2} \\ \cos x & , \text{ if} x \geq \frac{\pi}{2} \end{cases}$

Then

A. f(x) is discontinuous for all A and B

B. f(x) is continuous for A = -1 and B = 1

C. f(x) is continuous for A = 1 and B = -1

D. f(x) is continuous for all real values of A, B

Answer: B

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60. The value of p and q for which the function

$$f(x) = \begin{cases} \frac{\sin(p+1)x + \sin x}{x} & , \quad x < 0 \\ q & , \quad x = 0 \\ \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{3/2}} & , \quad x > 0 \end{cases}$$

is continuous for all x in R, are

A. $p = \frac{1}{2}, q = -\frac{3}{2}$

B. $p = \frac{5}{2}, q = \frac{1}{2}$

C. $p = -\frac{3}{2}, q = \frac{1}{2}$

D. $p = \frac{1}{2}, q = \frac{3}{2}$

Answer: C

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61. Q. For every integer n, let an and bn be real numbers. Let function $f: R \to R$ be given by a $f(x) = \{a_n + \sin \pi x, f \text{ or } x \in [2n, 2n+1]$,

$\_\ n + \cos \pi x, f \text{ or } x \in (2n+1, 2n)$ for all integers n.

A. $a_n - b_{n+1} = -1$

B. $a_{n-1} - b_{n-1} = 0$

C. $a_n - b_n = 1$

D. $a_{n-1} - b_n = -1$

Answer: B

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62. Let a function $f: R \to R$, where R is the set of real nos. satisfying the equation $f(x+y) = f(x) + f(y) \forall x, y$ if f(x) is

continuous at x = 0, then

A. f(x) is discontinuous $\forall k \in R - \{1\}$

B. f(x) is continuous $\forall k \in R$

C. f(x) is continuous $\forall k \in R - \{1, 2\}$

D. none of these

Answer: B

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63. The value of f(0) so that the function

$$f(x) = \frac{\sqrt{1+x} - (1+x)^{\frac{1}{3}}}{x}$$

becomes continuous is equal to

A. $\frac{1}{6}$

B. $\frac{1}{4}$

C. 2

D. $\frac{1}{3}$

Answer: A

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Evaluation Test

1. The value of f(0), so that the function $f(x) = \frac{1-\cos(1-\cos x)}{x^4}$ is continuous everywhere is

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{1}{6}$

D. $\frac{1}{8}$

Answer: D

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2. If $f(x)$ is continuous at $x = 0$, where $f(x) = \frac{\log(1+x^2) - \log(1-x^2)}{\sec x - \cos x}$, for $x \neq 0$, then $f(0) =$

A. 1

B. 2

C. 0

D. -1

Answer: B

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3. The value of f(0) , so that the function

$$f(x) = \frac{\sqrt{a^2 - ax + x^3} - \sqrt{a^2 + ax + x^2}}{\sqrt{a + x} - \sqrt{a - x}}$$

become continuous for all x, is given by

A. $a\sqrt{a}$

B. $\sqrt{a}$

C. $-\sqrt{a}$

D. $-a\sqrt{a}$

Answer: C

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4. If

$$f(x) = \frac{10^x + 7^x - 14^x - 5^x}{1 - \cos x}, \quad \text{for} x \neq 0$$
$$= \frac{10}{7}, \quad \text{for} x = 0$$

, then f(x) is

A. continuous at x = 0

B. discontinuous at x = 0, but it is removable

C. discontinuous at x = 0, but it is not removable

D. none of these

Answer: B

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5. $\lim_{x \to 0} \frac{\sin^3\left(\sqrt{x}\right)\log(1+3x)}{\left(\tan^{-1}\sqrt{x}\right)^2\left(e^{5\sqrt{x}}-1\right)x} =$

A. a = 0

B. $a = \frac{3}{5}$

C. $a = 2$

D. $a = \frac{5}{2}$

Answer: B

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6. The function $f(x) = (x-1)^{\frac{1}{(2-x)}}$ is not defined at x = 2. The value of f(2) so that f is continuous at x = 2 is

A. 1

B. e

C. $\frac{1}{e}$

D. $\frac{1}{e^2}$

Answer: C

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7. If the function $f(x) = \begin{cases} 1 + (\sin)\frac{\pi x}{2} & , \text{ for} -\infty < x \leq 1 \\ ax + b & , \text{ for} 1 < x < 3 \\ 6(\tan)\frac{\pi x}{12} & , \text{ for} 3 \leq x < 6 \end{cases}$

is continuous in the interval $(-\infty, 6)$, then the value of a and b are respectively

A. 0,2

B. 1,1

C. 2,0

D. 2,1

Answer: C

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8. $f(x) = x + |x|$ is continuous for

A. $x \in (-\infty, \infty)$

B. $x \in (-\infty, \infty), -\{0\}$

C. only $x > 0$

D. no value of x

Answer: A

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9. Let $f(x) = \begin{cases} (1+|\sin|)^{\frac{a}{|\sin x|}} & , -\frac{\pi}{6} < x < 0 \\ b & , x = 0 \\ e^{\frac{\tan 2x}{\tan 3x}} & , 0 < x < \frac{\pi}{6} \end{cases}$

Then the value of a and b if f is continuous at x = 0, are

respectively

A. $\frac{2}{3}, \frac{3}{2}$

B. $\frac{2}{3}, e^{\frac{2}{3}}$

C. $\frac{3}{2}, e^{\frac{3}{2}}$

D. none of these

Answer: B

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10. The function $f(x) = [x]^2 - [x^2]$, (where [y] is the greastest interger less than or equal to y), is discontinuous at

A. all intergers

B. all intergers except 0 and 1

C. all intergers except 0

D. all intergers except 1

Answer: D

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