MATHS

BOOKS - KUMAR PRAKASHAN KENDRA MATHS (GUJRATI ENGLISH)

LIMITS AND DERIVATIVES

Exercise 13 1

1. Evaluate the following limits in Exercises

$$\lim_{x \to 3} x + 3$$

2. Evaluate the following limits in Exercises

$$\lim_{x \to \pi} \left(x - \frac{22}{7} \right)$$

3. Evaluate the following limits in Exercises

$$\lim_{r \to 1} \pi r^2$$

4. Evaluate the following limits in Exercises

$$\lim_{x \to 4} \frac{4x + 3}{x - 2}$$

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5. Evaluate the following limits in Exercises

$$\lim_{x \to -1} \frac{x^{10} + x^5 + 1}{x - 1}$$

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6. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{(x + 1)^5 - 1}{x}$$

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7. Evaluate the following limits in Exercises

$$\lim_{x \to 2} \frac{3x^2 - x - 10}{x^2 - 4}$$

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8. Evaluate the following limits in Exercises

$$\lim_{x \to 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$$

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9. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{ax + b}{cx + 1}$$

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10. Evaluate the following limits in Exercises

$$\lim_{z \to 1} \frac{z^{\frac{1}{3}} - 1}{z^{\frac{1}{6}} - 1}$$

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11. Evaluate the following limits in Exercises

$$\lim_{x \to 1} \frac{ax^2 + bx + c}{cx^2 + bx + a}, \ a + b + c \neq 0$$

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12. Evaluate the following limits in Exercises

$$\lim_{x \to -2} \frac{\frac{1}{x} + \frac{1}{2}}{x + 2}$$

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13. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{\sin(ax)}{()bx}$$

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14. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{\sin(ax)}{\sin(bx)} (a, b \neq 0)$$

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15. Evaluate the following limits in Exercises

$$\lim_{x \top i} \frac{\sin(\pi - x)}{\pi(\pi - x)}$$

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16. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{\cos x}{\pi - x}$$

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17. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{\cos(2x) - 1}{\cos x - 1}$$

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18. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{ax + x \cos x}{b \sin x}$$

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19. Evaluate the following limits in Exercises

$$\lim_{x \to 0} \frac{\sin ax + bx}{ax + \sin bx} a, b, a + b \neq 0$$

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20. Evaluate the following limits in Exercises

$$\lim_{x \to \frac{\pi}{2}} \frac{\tan 2x}{x - \frac{\pi}{2}}$$

21. Find $\lim_{x \to 0} f(x)$ and $\lim_{x \to 1} f(x)$, where

$$f(x) = \begin{cases} 6x + 3, & x \le 0 \\ x + 6, & x > 0 \end{cases}$$

22. Find $\lim_{x \to 1} f(x)$, where f(x)=

$$\begin{cases} \lim & x^2 - 1, x \leq 1 \\ - x^2 - 1, x > 1 \end{cases}$$

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23. Evaluate

$\lim_{x \to 0} f(x)$, where $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

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24.   Evaluate

$$\lim_{x \to 0} f(x), \quad \text{where} \quad f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

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25. Suppose f(x) = $\begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax, & x > 1 \end{cases}$

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26. Let $a_1, a_2, \ldots, a_n$ be fixed real numbers and define a function $f(x) = (x - a_1)(x - a_2)\ldots(x - a_n).$ What is $\lim\limits_{x \to a_1} f(x)$? For some $a \neq a_1, a_2, \ldots, a_n,$ compute $\lim\limits_{x \to a} (f(x).$

27. If $f(x) = \begin{cases} |x| + 1, & x < 0 \\ 0, & x = 0 \\ |x| - 1, & x > 0 \end{cases}$

For what value(s) of a does $\lim\limits_{x \to a} f(x)$ exists?

28. In the function f(x) satisfies $\lim\limits_{x \to 1} \dfrac{f(x) - 2}{x^2 - 1} = \pi$ evaluate $\lim\limits_{x \to 1} f(x)$.

29. If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \le x \le 1 \\ nx^3 + m, & x > 1 \end{cases}$. For what integers m and n does both $\lim\limits_{x \to 0} f(x)$ and $\lim\limits_{x \to 1} f(x)$ exist?

1. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{e^{4x} - 1}{x}$$

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2. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{e^{2+x} - e^2}{x}$$

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3. Find limit of the following if it exists:

$$\lim_{x \to 5} \frac{e^x - e^5}{x - 5}$$

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4. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{e^{\sin} - 1}{x}$$

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5. Find limit of the following if it exists:

$$\lim_{x \to 3} \frac{e^x - e^3}{x - 3}$$

▶ **Watch Video Solution**

6. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{x(e^x - 1)}{1 - \cos x}$$

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7. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{\log_e(1 + 2x)}{x}$$

8. Find limit of the following if it exists:

$$\lim_{x \to 0} \frac{\log(1 + x^3)}{\sin^3 x}$$

Exercise 13 3

1. Find the derivative of $x^2 - 2$ at point x-10

2. Find the derivative of x at x=1

3. Find the derivative of 99x at x=100.

4. Find the derivtive of the following functions from first principle.

$$x^3 - 27$$

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5. Find the derivative of the following functions from first principle.

$$(x - 1)(x - 2)$$

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6. Differentiate the functions $\dfrac{1}{x^2}$

7. Find the derivative of the following functions $\dfrac{x+1}{x-1}$

8. For the function

$$f(x) = \dfrac{x^{100}}{100} + \dfrac{x^{99}}{99} + \ldots\ldots + \dfrac{x^2}{2} + x + 1.$$

Prove that

$$f'(1) = 100f'(0).$$

9. Find the derivative of

$$x^n + ax^{n-1} + a^2 x^{n-2} + \ldots + a^{n-1}x + a^n$$

for some fixed real number a.

10. For some constants a and b ,find the derivate of: $\dfrac{x^2}{2} - (a + b)x$

11. Find the derivative of the following functions $\left(ax^2 + b\right)^2$

12. $\dfrac{x - a}{x - b}$

13. Find the derivative of $\dfrac{x^n - a^n}{x - a}$ for some constant a.

14. Find the derivate of

$2x - \dfrac{3}{4}$

15. Find the derivate of

$$\left(5x^3 + 3x - 1\right)(x - 1)$$

16. Find the derivate of

$$x^{-3}\left(5 + 3x\right)$$

17. Find the derivate of

$$x^5 \left(3 - 6x^{-9} \right)$$

18. Find the derivate of

$$x^{-4} \left(3 - 4x^{-5} \right)$$

19. Find the derivate of

$$\frac{2}{x+1} - \frac{x^2}{3x-1}$$

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20. Find the derivative of cos x from first principle .

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21. Find the derivative of the following functions:

(i)Sinx.cos x

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22. Find the derivative of the following functions:

secx

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23. Find the derivative of the following functions:

$5 \sec x + 4 \cos x$

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24. Find the derivative of the following functions:

$\operatorname{cosec} x$

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25. Find the derivative of the following functions:

3 cot x +5 cosec x

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26. Find the derivative of the following functions:

5sin x-6 cosx+7

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27. Find the derivative of the following functions:

2 tan x -7 sec x

Miscellaneous Exercise 13

1. Find the derivative of the following functions from first principle

$-x$

2. Find the derivative of the following functions from first principle

$$(- x)^{-1}$$

3. Find the derivative of the following functions from first principle

sin (x+1)

4. Find the derivative of the following functions from first principle

$$\cos\left(x - \frac{\pi}{8}\right)$$

5. Find the derivative of the following functions :(It is to be understood that a,b,c,d,p,q,r and s are fixed non-zero constants and m and n are intergers): (x+a)

6. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$$(px + q)\left(\frac{r}{x} + s\right)$$

7. $(ax + b)(cx + d)^2$

8. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$$\frac{ax + b}{cx + d}$$

9. Find the derivative of the following functions (it is to be understood that a, b, c, d,

p, q, r and s are fixed non-zero constants and

m and n are integers):

$$\left(\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} \right)$$

10. Find the derivative of the following

functions (it is to be understood that a, b, c, d,

p, q, r and s are fixed non-zero constants and

m and n are integers):

$$\frac{1}{ax^2 + bx + c}$$

11. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$$\frac{ax + b}{px^2 + qx + r}$$

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12. Find the derivative of the following functions (it is to be understood that a, b, c, d,

p, q, r and s are fixed non-zero constants and

m and n are integers):

$$\frac{px^2 + qx + r}{ax + b}$$

13. $\dfrac{a}{x^4} - \dfrac{b}{x^2} + \cos x$

14. $4\sqrt{x} - 2$

15. Find the derivative of the following functions $(ax + b)^n$

16. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$(ax + b)^n (cx + d)^m$

17. sin (x+a)

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18. cosec x cot x

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19. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$$\frac{\cos x}{1 + \sin x}$$

20. $\dfrac{\sin x + \cos x}{\sin x - \cos x}$

21. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and m and n are integers):

$$\frac{\sec x - 1}{\sec x + 1}$$

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22. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and

m and n are integers):

$$\sin^n x$$

23. $\dfrac{a + b \sin x}{c + d \cos x}$

24. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and

m and n are integers):

$$\frac{\sin(x + a)}{\cos x}$$

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25. Differentiate w.r.t x $x^4(5\sin x - 3\cos x)$

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26. $(x^2 + 1)\cos x$

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27. $\left(ax^2 + \sin x\right)(p + q \cos x)$

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28. $(x + \cos x)(x - \tan x)$

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29. $\dfrac{4x + 5 \sin x}{3x + 7 \cos x}$

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30. $\dfrac{x^2 \frac{\cos(\pi)}{4}}{\sin x}$

31. $\dfrac{x}{1 + \tan x}$

32. Find the derivative of the following functions (it is to be understood that a, b, c, d, p, q, r and s are fixed non-zero constants and

m and n are integers):

$$(x + \sec x)(x - \tan x)$$

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33. Differentiate the following w.r.t. x: $\dfrac{x}{\sin^n x}$

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Textbook Based Mcqs

1. $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{1 - \sin x}{\cos x} = \ldots\ldots\ldots$

A. 1

B. 0

C. -1

D. 2

Answer: B

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2. $\lim\limits_{x \to 0} \dfrac{|x|}{x} = $ ....

A. 1

B. -1

C. 0

D. Does not exists

Answer: D

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3. $\lim\limits_{x \top i} \dfrac{\tan x}{\pi - x}$=..........

A. 1

B. -1

C. 0

D. Does not exists

Answer: B

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4. If $\lim\limits_{x \to 1} \dfrac{x^{2019} - 1}{x^n - 1} = -\dfrac{2019}{2018}$ then n=.........

A. -2017

B. 2018

C. 2017

D. -2018

Answer: C

5. $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{\sin(\cos x)}{\frac{\pi}{2} - x} =$.........

A. 0

B. 1

C. -1

D. None of these

Answer: B

6. $\lim\limits_{x \to 0^+} \dfrac{|\sin x|}{x} = \ldots\ldots\ldots$

A. 1

B. -1

C. 0

D. Does not exists

Answer: A

7. $\lim\limits_{x \to 1} \dfrac{(\sqrt{x} - 1)(2x - 3)}{2x^2 + x - 3}$ =......

A. 1

B. $\dfrac{1}{10}$

C. $-\dfrac{1}{10}$

D. Does not exists

Answer: C

8. $\displaystyle\lim_{x \to \frac{\pi}{4}} \frac{\sqrt{2}\sin x - 1}{\cos(2x)}$)=..........

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

B. $2arqt(2)$

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

D. $\sqrt{2}$

Answer: C

9. If $1lr f(x) x^2 + 2x + 2, Aax \in R$ then

$$\lim_{x \to -1} f(x) = \ldots\ldots\ldots$$

A. 2

B. 0

C. -1

D. 1

Answer: D

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10. $\lim\limits_{x \to 5^+} [x] = ...$

A. 0

B. 5

C. -5

D. 4

Answer: B

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11. $\lim\limits_{x \to -4^-} [x] = \ldots\ldots\ldots$

A. 5

B. -5

C. -4

D. 4

Answer: B

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12. $\lim\limits_{x \to a} \dfrac{\sin x - \sin a}{x - a} = \ldots\ldots$

A. cos a

B. sin a

C. a

D. 0

Answer: A

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13. $\displaystyle\lim_{x \to 0} \frac{\tan x - 5x}{7x - \sin x} = ...$

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

B. $-\dfrac{2}{3}$

C. $\dfrac{5}{7}$

D. $-\dfrac{5}{7}$

Answer: B

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14. $\lim\limits_{x \to a} \dfrac{x^{\frac{1}{3}} - a^{\frac{1}{3}}}{x^{\frac{1}{5}} - a^{\frac{1}{5}}}, \ (a > 0) =$..........

A. $\dfrac{1}{3}a^{\frac{3}{5}}$

B. $\dfrac{1}{5}a\left(\dfrac{1}{15}\right)$

C. $\dfrac{5}{3}a\left(\dfrac{5}{3}\right)$

D. $\dfrac{5}{3}a^{\frac{2}{15}}$

Answer: D

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15. If $5f(x)+3f\left(\dfrac{1}{x}\right)=x+2, y=xf(x)$, then the value of $\left(\dfrac{dy}{dx}\right)(x=1)$ =.........

A. $\dfrac{3}{5}$

B. $\dfrac{14}{3}$

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

D. $\dfrac{15}{7}$

Answer: C

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16. If $y = 1 + x + \dfrac{x^2}{2!} + \dfrac{x^2}{3!} + \ldots\ldots + \dfrac{x^n}{n!}$

then $\dfrac{dy}{dx} = \ldots\ldots\ldots$

A. y

B. y-x

C. $y - \dfrac{x^n}{n!}$

D. $y - \dfrac{x^n}{(n-1)!}$

Answer: C

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17. $\lim\limits_{x \to a} \dfrac{xf(a) - af(x)}{x - a} = f(a) - (a)f'(a).$

A. af'(a)

B. f(a)-af'(a)

C. f'(a)

D. $\dfrac{f'(a)}{a}$

Answer: B

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18. If $f(x) =$

$x^{n-1} + x^{n-2} + \ldots + 1, \; -1 < x < 1$ then

f'(x)=.......

A. $\dfrac{1}{(x-1)^2}$

B. $\dfrac{1}{x-1}$

C. $\dfrac{1}{x^n - 1}$

D. $\dfrac{(n-1)x^n - nx^{n-1} + 1}{(1-x)^2}$

Answer: D

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19. If f(4)=16 ,f'(4)=2 and f is differentiable of x=4 then $\lim\limits_{x \to 4} \dfrac{\sqrt{f(x)} - 4}{x - 4}$ =......

A. 2

B. 1

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

D. $\dfrac{1}{16}$

Answer: C

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20. $\dfrac{d}{dx}(x+|x|)|x|=\ldots\ldots(x<0)$

A. 1

B. 0

C. 2

D. 4

Answer: B

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21. $\dfrac{d}{dx}(\sin 180^\circ)=\ldots\ldots$

A. $\cos 18°$

B. $-\sin 18°$

C. $-xos18°$

D. 0

Answer: D

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22. $\dfrac{d}{dx}(\sin x°)$=.......

A. $\cos x°$

B. $-\sin x^{\circ}$

C. $\dfrac{\pi}{180}\cos x^{\circ}$

D. 0

Answer: C

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23. $\dfrac{d}{dx}\left(\sqrt{\sin x}\right)=\text{............}\left(0 < x < \dfrac{\pi}{2}\right)$

A. $\sqrt{\cos x}$

B. $\sqrt{\sin x}$

C. $\dfrac{\cos x}{2\sqrt{\sin x}}$

D. $\dfrac{\sin x}{2\sqrt{\cos x}}$

Answer: C

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24. $\dfrac{d}{dx}\left(\tan^2 x\right) = \text{........}$

A. 2tan x

B. $\sec^2 x$

C. $\cot^2 x$

D. $2 \tan x \sec^2 x$

Answer: D

25. $\dfrac{d}{dx}\sqrt{x^2 - 2x + 1}$=..........

A. 0

B. 1

C. -1

D. Does not exists

Answer: C

26. $\lim\limits_{y \to 0^+} \dfrac{3\sqrt{y} + 3\sqrt{y^2} - 4\sqrt{y^3}}{3\sqrt{y} + y + 4\sqrt{y^3}}$ =.........

A. -1

B. 1

C. 0

D. Limit does not exists

Answer: B

27. $\lim\limits_{x \to 1} \dfrac{x^{365} - 365x + 364}{(x - 1)^2} = ...$

A. 66.463

B. 64.34

C. 66.63

D. 64.436

Answer: A

28. If $\lim\limits_{y \to -2} \dfrac{3x^2ax + a + 3}{x^2 + x - 2}$ limit exists then

a=...........

A. 15

B. -15

C. 12

D. -12

Answer: A

29. $\lim\limits_{h \to 0} \dfrac{4\sqrt{x+h} - 4\sqrt{x}}{h}$ =............

A. $\dfrac{1}{4}x^{\frac{3}{4}}$

B. $-\dfrac{1}{4}x^{-\frac{3}{4}}$

C. $\dfrac{1}{4}x^{-\frac{3}{4}}$

D. 1

Answer: C

30. $\lim\limits_{x \to 1} \dfrac{x + x^2 + x^3 + \ldots\ldots + n^n - n}{x - 1}$

=...........,where n $\in$ N

    A. $\Sigma 1$

    B. Σn

    C. Σn^2

    D. Σn^3

Answer: B

31. $f(x)=\begin{cases} \dfrac{1-\sin x}{\pi - 2x} & ,x \neq \dfrac{\pi}{2} \\ \lambda, & x = \dfrac{\pi}{2} \end{cases}$

If f(x) is continious of x=$\dfrac{\pi}{2}$ then λ=...............

A. -1

B. 1

C. 0

D. 2

Answer: C

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32. $\lim\limits_{x \to a} \dfrac{f(x) - f(a)}{x^3 - a^3} = $...............

A. $f'(a)\dfrac{1}{3a^2}$

B. $3a^2 - \dfrac{2}{f(a)}$

C. $f'(a)3a^2$

D. None of these

Answer: A

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33. If $\dfrac{d}{dx}\left(\dfrac{1+x^4+x^8}{1+x^2+x^4}\right) = ax^3 + bx$ then

....

A. a=4,b=2

B. a=4,b=-2

C. a=-2,b=4

D. None of these

Answer: B

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34. $\displaystyle\lim_{x \to 1} (1 - x)\tan\left(x\dfrac{\pi}{2}\right) = \ldots\ldots$

A. $\dfrac{\pi}{4}$

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

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

D. $\dfrac{4}{\pi}$

Answer: C

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35. $f(x) = \begin{cases} \dfrac{2x+3}{3x+2} & x > 0 \\ \dfrac{\sin 3x}{2x} & x < 0 \\ \dfrac{3}{2} & x = 0 \end{cases}$ તો ....

A. $a = \dfrac{-3}{2}, b = 0c = \dfrac{1}{2}$

B. $a = \dfrac{3}{2}, b \neq 0, c = \dfrac{1}{2}$

C. $a = \dfrac{-3}{2}, b \neq 0, c = \dfrac{1}{2}$

D.

Answer: C

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1. $\forall t \in R$ suppose [t] has value t of all integer value of less than t then,

$$\lim_{x \to 0+} x\left(\left[\frac{1}{x}\right] + \left[\frac{2}{x}\right] + \text{.......} + \left[\frac{15}{x}\right]\right)$$

A. Equal to 0

B. Equal to 15

C. Equal to 120

D. Does not exists in R

Answer: C

2. $f(x) = x + \tan x$ and f is an inverse function of g then g'(x)= ....

    A. ϕ (void set)

    B. {0}

    C. $\{\pi\}$

    D. $\{0, \pi\}$

Answer: A

Textbook Illustrations For Practice Work

1. Find the limits:

$$\lim_{x \to 1} \left[x^3 - x^2 + 1\right]$$

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2. Find the limits:

$$\lim_{x \to 3} \left[x(x + 1)\right]$$

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3. Find the limits:

$$\lim_{x \to -1} \left[1 + x + x^2 + \ldots\ldots + x^{10} \right]$$

4. Find the limits:

$$\lim_{x \to -1} \left[\frac{x^2 + 1}{x + 100} \right]$$

5. Find the limits:

$$\lim_{x \to 2} \left[\frac{x^2 - 4}{x^3 - 4x^2 + 4x} \right]$$

6. Find the limits:

$$\lim_{x \to 2} \left[\frac{x^3 - 2x^2}{x^2 - 5x + 6} \right]$$

7. Find the limits :

$$\lim_{x \to 1} \left[\frac{x - 2}{x^2 - x} - \frac{1}{x^3 - 3x^2 + 2x} \right]$$

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8. Evaluate :

$$\lim_{x \to 1} \frac{x^{15} - 1}{x^{10} - 1}$$

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9. Evaluate :

$$\lim_{x \to 0} \frac{\sqrt{1+x} - 1}{x}$$

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10. Evaluate :

$$\lim_{x \to 0} \frac{\sin 4x}{\sin 2x}$$

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11. Evaluate :

$$\lim_{x \to 0} \frac{\tan x}{x}$$

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12. Compute : $\lim_{x \to 0} \dfrac{e^{3x} - 1}{x}$

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13. Evaluate : $\lim_{x \to 1} \dfrac{x^{18} - 1}{18x - 18}$

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14. Find the derivative at $x = 2$ of the function

$f(x) = 3x.$

15. Find the derivative of the function f(x)=

$2x^2 + 3x - 5$ at x=-1 .Also prove that

f'(0)+3f'(-1)=0

16. Find the derivative of sin x at x=0

17. Find the derivative of

$f(x) = 3atx = 0$ and $atx = 3.$

18. find the derivative of f(x)=10x

19. Find the derivative of $f(x) = x^2$.

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20. Find the derivative of the constant function $f(x) = a$ for a fixed real number a.

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21. Find the derivative of $f(x) = \dfrac{1}{x}$

22. Compute the derivative of $6x^{100} - x^{55} + x.$

23. Find the derivative of f(x)=1+x+ $x^2 + x^3 + \ldots\ldots + x^{50}$ at x=1

24. Find the derivative of $f(x) = \dfrac{x+1}{x}$

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25. Compute the derivative of sin x.

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26. Compute the derivative of tan x.

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27. Compute the derivative of $f(x) = \sin^2 x$.

28. Find the derivative of f form the first principle. Where f is give by ,

$$f(x) = \frac{2x + 3}{x - 2}$$

29. Find the derivative of f from the first principle, where f is given by

$$f(x) = x + \frac{1}{x}$$

30. Find the derivative of f(x) from the first

principle where f(x) is

sin x+ cos x

31. Find the derivative of f(x) from the first

principle where f(x) is

x sin x

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32. Compute derivative of

f(x)=sin 2x

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33. Compute derivative of

$$g(x) = \cot x$$

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34. Find the derivative of

$$\frac{x^2 - \cos x}{\sin x}$$

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35. Find the derivative of

$$\frac{x + \cos x}{\tan x}$$

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