MATHS

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APPLICATIONS OF INTEGRATION

Worked Example

1. Evaluate $\int_0^1 x^3 dx$, as the limit of a sum.

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2. Evaluate $\int_0^1 x^3 dx$, as the limit of a sum.

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3. Evaluate $\int_0^2 \left(3x^2 + 4x - 15\right) dx$

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4. Evaluate : $\int_0^2 \frac{3x + 5}{x^2 + 4} dx.$

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5. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin x}{4+\cos^2 x} dx.$

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6. Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{1+\sin 2x} dx.$

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7. Evaluate $\int_1^4 \frac{dx}{\sqrt{8+2x-x^2}}$

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8. Evaluate $\int_0^1 \frac{dx}{\sqrt{x+1}+\sqrt{x}}$.

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9. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos\theta d\theta}{(\sin\theta+2)(\sin\theta+3)}$.

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10. Evaluate $\int_0^1 \tan x\sqrt{\sec x}dx$.

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11. Evaluate $\int_0^1 \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx.$

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12. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx.$

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13. Show that $\int_0^{\pi} g(\sin x) dx = 2\int_0^{\frac{\pi}{2}} g(\sin) dx,$ where

$g(\sin x)$ is a function of $\sin x$.

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14. Show that $\int_0^{2\pi} g(\cos x)dx = 2\int_0^{\pi} g(\cos x)dx,$ wher $g(\cos x)$ is a function of $\cos x$.

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15. If $f(x) = f(a+x)$ then show that $\int_0^{2a} f(x)dx = 2\int_0^{a} f(x)dx.$

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16. $\int \frac{1}{1+\sin x} dx$:

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17. Evaluate $\int_{-1}^{1} \frac{x^2}{x^2+1} dx$.

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18. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x} dx.$

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19. Evaluate $\int_0^1 \sin^{-1} x + \sin^{-1}(1-x) dx.$

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20. $\int_1^2 \frac{\sqrt{x}}{\sqrt{3-x} + \sqrt{x}} dx.$

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21. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos^3 x}{1+3^x} dx.$

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22. Evaluate $\int x^3 \sin 2x dx.$

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23. Evaluate $\int_0^1 e^{-x}\left(1+x^2\right) dx.$

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24. Evaluate $\int_0^{2\pi} x^2 \sin 2x dx.$

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25. Evalaute $\int_{-1}^{1} e^{-kx}(1+x)dx.$

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26. Evalaute $\int_b^{\propto} \frac{dx}{a^2+x^2} a > 0, b \varepsilon R.$

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27. Evaluate $\int_0^{\frac{\pi}{2}} \frac{dx}{4\sin^2 x + 9\cos^2 x}$.

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28. Evaluate $\int_0^{\frac{\pi}{2}} \left(3\sin^3 x + 4\cos^4 x\right) dx$.

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29. Evaluate $\int_0^{\frac{\pi}{2}} \begin{vmatrix} \cos^5 x & 2 \\ \sin^7 x & 3 \end{vmatrix} dx$.

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30. Evaluate $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^2 x dx.$

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31. Evaluate $\int_0^{\frac{\pi}{2}} \sin^5 x \cos^4 x dx.$

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32. Evaluate $\int_0^1 x^6 \left(\sqrt{1-x^2}\right)^5 dx.$

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33. Evaluate $\int_0^1 x^3(1-x)^3 dx.$

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34. Evaluate $\int_0^{\infty} e^{-ax} x^{n-1} dx, a > 0$ in terms of Gamma function.

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35. Evaluate $\int_0^{\infty} \frac{x^k}{k^x} dx$ where $k \geq 2$.

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36. Find the area bounded by $2y - 3x - 6 = 0$, x axis and the ordinates $x = -1$ and $x = 2$.

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37. Find the area bounded by $x = 1$ and $x = 2$, x axis and the line $4x - 3y = 12$.

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38. Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

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39. Find the area of the parabola $y^2 = 4ax$ and its latus rectum.

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40. Find the area bounded by the curve $x = 7 - 6y - y^2$.

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41. Find the area bounded by $y = \cos x$, the lines $x = 0$ and $x = 2\pi$.

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42. Find the area of the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.

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43. Find the area of the region bounded by $y^2 = 4ax$ and $x = |y|$.

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44. Find the area of the region common to the circle $x^2 + y^2 = 16$ and the parabola $y^2 = 6x$.

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45. The region enclsoed by the circle $x^2 + y^2 = a^2$ is divided into two segments by the line $x = \frac{a}{2}$. Find the area of the minor segment .

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46. Find the area of the region bounded by the lines $2x - y - 6 = 0$ and $2x + 3y + 10 = 0$ and x axis.

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47. Using integration find the area of the region bounded by the triangle ABC whose vertex area (0,2),(4,3) and (1,6) respectively.

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48. Find the area between the curve $y = x^2 - x - 2$, x axis and the lines $x = -2$ and $x = 4$.

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49. Find the volume of ellipsoid when the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ revolves around x axis .

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50. Derive the volume of a cone using integration.

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51. Find the volume of the solid generated when the region enclosed by $y = \sqrt{x}, y = 3$ and $x = 0$ is revolved about y axis.

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52. Find the volume of solid that results when the region enclosed by the curve $y = 1 + x^2, x = 0, x = 2, y = 0$ is revolved about the x axis.

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53. Find the volume of the solid, obtained by revolving the area of the triangle whose sides are having the equations $y = 0, x = 3$ and $2x - 3y = 0$ about x axis .

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54. Evaluate the volume of the solid generated by revolving about y axis the region bounded

between the parabola $y^2 = x + 1$, the y axis and the lines $y = 1$ and $y = -1$.

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55. Find the volume of the solid generated by an arch of the curve $y = \sin 2x$ about x axis .

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56. Find , by integration , the volume of the solid generated by revolving about y axis, the

region bounded by the curve $y = \log x, y = 0, x = 0$ and $y = 2.$

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Solution To Exercises 9 1

1. Find an approximate value of $\int_1^{1.5} x dx$ by applying the left-end rule with the partition $\{1.1, 1.2, 1.3, 1.4, 1.5\}$

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2. Find the approximate value of $\int_1^{1.5} x^2 dx$ by applying the right-end rule with the parition $\{1.1, 1.2, 1.3, 1.4, 1.5\}$

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3. Find an approximate value of $\int_1^{1.5} (2 - x) dx$ by applying the mid-point rule with the partition $\{1.1, 1.2, 1.3, 1.4, 1.5\}$

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Solution To Exercises 9 3

1. Evaluate the following definite integrals :

$$\int_3^4 \frac{dx}{x^2-4}$$

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2. Evaluate the following definite integrals :

$$\int_{-1}^1 \frac{dx}{x^2+2x+5}$$

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3. Evaluate the following definite integrals :

$$\int_0^1 \sqrt{\frac{1-x}{1+x}}\,dx$$

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4. Evaluate the following definite integrals :

$$\int_0^1 \frac{1-x^2}{(1+x^2)^2}\,dx$$

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5. Evaluate the following integrals using properties of integration :

$$\int_{-5}^{5} x \cos\left(\frac{e^x - 1}{e^x + 1}\right) dx$$

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6. Evaluate the following integrals using properties of integration :

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(x^5 + x \cos x + \tan^3 x + 1\right) dx$$

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7. Evaluate the following integrals using properties of integration :

$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x dx$$

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8. Evaluate the following integrals using properties of integration :

$$\int_0^{2\pi} x \log\left(\frac{3+\cos x}{3-\cos x}\right) dx$$

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9. Evaluate the following integrals using properties of integration :

$$\int_0^{2\pi} \sin^4 x \cos^3 x dx$$

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10. Evaluate the following integrals using properties of integration :

$$\int_0^1 |5x - 3| dx$$

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11. Evaluate the following integrals using properties of integration :

$$\int_0^{\sin^2 x} \sin^{-1}\sqrt{t}dt + \int_0^{\cos^2 x} \sqrt{t}dt$$

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12. Evaluate the following integrals using properties of integration : $\int_0^1 \frac{\log(1+x)}{1+x^2}dx.$

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13. Evaluate the following integrals using properties of integration :

$$\int_0^{\pi} \frac{x \sin x}{1+\sin x} dx$$

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14. Evaluate the following integrals using properties of integration :

$$\int_{\frac{\pi}{8}}^{\frac{3\pi}{8}} \frac{1}{1+\sqrt{\tan x}} dx$$

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15. Evaluate the following integrals using properties of integration :

$$\int_0^{\pi} x\left[\sin^2(\sin x) + \cos^2(\cos x)\right] dx$$

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Solution To Exercises 9 4

1. Evaluate the following :

$$\int_0^1 x^3 e^{-2x} dx$$

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2. Evaluate the following :

$$\int_0^1 \frac{\sin\left(3\tan^{-1}x\right)\tan^{-1}x}{1+x^2}dx$$

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3. Evaluate the following :

$$\int_0^{\frac{1}{\sqrt{2}}} \frac{e^a \sin^{-1}x \sin^{-1}x}{\sqrt{1-x^2}}dx$$

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4. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} x^2 \cos 2x dx$$

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Solution To Exercises 9 5

1. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \frac{dx}{1+5\cos^2 x}$$

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2. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \frac{dx}{5+4\sin^2 x}$$

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Solution To Exercises 9 6

1. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \sin^{10} x dx$$

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2. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \cos^7 x dx$$

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3. Evaluate the following :

$$\int_0^{\frac{\pi}{4}} \sin^6 2x dx$$

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4. Evaluate the following :

$$\int_0^{\frac{\pi}{6}} \sin^5 3x dx$$

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5. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \sin^2 x \cos^4 x dx$$

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6. Evaluate the following :

$$\int_0^{2\pi} \sin^7 \frac{x}{4} dx$$

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7. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \sin^3 \theta \cos^5 \theta d\theta$$

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8. Evaluate the following :

$$\int_0^1 x^2(1-x)^3 dx$$

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Solution To Exercises 9 7

1. Evaluate the following :

$$\int_0^\infty x^5 e^{-3x} dx$$

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2. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \frac{e^{-\tan x}}{\cos^6 x} dx$$

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Solution To Exercises 9 8

1. Find the area of the region bounded by $3x - 2y + 6 = 0, x = -3, x = 1$ and x -axis.

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2. Find the area of the region bounded by $2x - y + 1 = 0, y = -1, y = 3$ and y -axis.

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3. Find the area of the region bounded by the curve $2 + x - x^2 + y = 0$, x-axis, $x = -3$ and x= 3

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4. Find the area of the region bounded by the line $y = 2x + 5$ and the parabola $y = x^2 - 2x$

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5. Find the area of the region bounded between the curves $y = \sin x$ and $y = \cos x$ and the lines x = 0 and $x = \pi$.

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6. Find the area of the region bounded by $y = \tan x, y = \cot x$ and the line $x = 0, x = \frac{\pi}{2}, y = 0$

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7. Find the area of the region bounded by the parabola $y^2 = x$ and the line $y = x - 2$

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8. Father of a family wishes to divide his square field bounded by $x = 0, x = 4, y = 4,$ and $y = 0$ along the curve $y^2 = 4x$ and $x^2 = 4y$ into three equal parts for his wife, daughter and son. Is it possible to divide ? If so, find the area to be divided among them.

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9. The curve $y = (x - 2)^2 + 1$ has a minimum point at P.A point Q on the curve is such that

the slope of PQ is 2. Find the area bounded by the curve and the chord PQ.

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10. Find the area of the region common to the circle $x^2 + y^2 = 16$ and the parabola $y^2 = 6x$.

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Solution To Exercises 9 9

1. Find,by integration, the volume of the solid generated by revolving about the x-axis, the region enclosed by $y = 2x^2$, $y = 0$ and $x = 1$.

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2. Find, by integration , the volume of the solid generated by revolving about the x-axis, the region enclosed by $y = e^{-2x} y = 0$, $x = 0$ and $x = 1$

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3. Find, by integration , the volume of the solid generated by revolving about the y-axis, the region enclosed by $x^2 = 1 + y$ and $y = 3$.

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4. The region enclosed between the graphs of $y = x$ and $y = x^2$ is denoted by R, Find the volume generated when R is rotated through 360° about x - axis.

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5. A watermelon has an ellipsoid shade which can be obtained by revolving an ellipse with major-axis 20 cm and minor-axis 10 cm about its major-axis. Find its volume using integration.

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Solution To Exercises 9 10

1. The value of $\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is

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

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

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

D. π.

Answer: A

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2. The value of $\int_{-1}^{2} |x| dx$

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

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

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

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

Answer: C

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3. For any value of $n \in Z, \int_0^{\pi} e^{\cos^2 x} \cos^3[(2n+1)x]dx$ is

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

B. π

C. 0

D. 2

Answer: C

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4. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x dx$ is

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

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

C. 0

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

Answer: D

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5. The value of $\int_{-4}^{4}\left[\tan^{-1}\left(\frac{x^2}{x^4+1}\right)+\tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is

A. π

B. 2π

C. 3π

D. 4π.

Answer: D

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6. The value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \left(\frac{2x^7 - 3x^5 + 7x^3 - x + 1}{\cos^2 x} \right) dx$ is

A. 4

B. 3

C. 2

D. 0

Answer: C

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7. If $f(x) = \int_0^x t \cos t dt$, then $\frac{df}{dx}$

A. $\cos x - x \sin x$

B. $\sin x + x \cos x$

C. $x \cos x$

D. $x \sin x$.

Answer: C

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8. The area between $y^2 = 4x$ and its latus rectum is

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

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

C. $\frac{8}{3}$

D. $\frac{5}{3}$

Answer: B

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9. The value of $\int_0^1 x(1-x)^{99}dx$ is

A. $\frac{1}{11000}$

B. $\frac{1}{10100}$

C. $\frac{1}{10010}$

D. $\frac{1}{10001}$.

Answer: B

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10. The value of $\int_0^{\pi} \frac{dx}{1+5^{\cos x}}$ is :

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

B. π

C. $\frac{3\pi}{2}$

D. 2π.

Answer: A

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11. The value of $\frac{r(n+2)}{r(n)} = 90$ then n is

A. 10

B. 5

C. 8

D. 9

Answer: D

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12. The value of $\int_0^{\frac{\pi}{6}} \cos^3 3x dx$

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

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

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

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

Answer: B

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13. The value of $\int_0^{\pi} \sin^4 x dx$ is

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

B. $\frac{3\pi}{8}$

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

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

Answer: B

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14. The value of $\int_0^{\infty} e^{-3x}x^2dx$ is

A. $\frac{7}{27}$

B. $\frac{5}{27}$

C. $\frac{4}{27}$

D. $\frac{2}{27}$.

Answer: D

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15. If $\int_0^a = \frac{1}{4+x^2}dx = \frac{\pi}{8}$ then a is

A. 4

B. 1

C. 3

D. 2

Answer: B

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16. The volume of solid of revolution of the region bounded by $y^2 = x(a - x)$ about x-axis is

A. πa^3

B. $\frac{\pi a^3}{4}$

C. $\frac{\pi a^3}{5}$

D. $\frac{\pi a^3}{6}$

Answer: D

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17. If $f(x) = \int_1^x \frac{e^{\sin x}}{u} du, x > 1$ and $\int_1^3 \frac{e^{\sin x^2}}{x} dx = \frac{1}{2}[f(a) - f(1)]$, then one of the possible value of a is

A. 3

B. 6

C. 9

D. 1

Answer: C

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18. The value of $\int_0^1 \left(\sin^{-1} x\right)^2 dx$ is

A. $\frac{\pi^2}{4} - 1$

B. $\frac{\pi^2}{4} + 2$

C. $\frac{\pi^2}{4} + 1$

D. $\frac{\pi^2}{4} - 2.$

Answer: D

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19. The value of $\int_0^a \left(\sqrt{a^2 - x^2}\right) dx$ is

A. $\frac{\pi a^3}{16}$

B. $\frac{3\pi a^4}{16}$

C. $\frac{3\pi a^4}{8}$

D. $\frac{3\pi a^4}{8}$.

Answer: B

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20. If $\int_0^x f(t)dt = x + \int_x^1 tf(t)dt$, then the value of f(1) is

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

B. 2

C. 1

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

Answer: A

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Problems For Practice Choose The Correct Answer

1. The area of the curve $y = x(x-1)$ between $x = 0$ and $x = 1$ is :

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

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

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

D. 1.

Answer: A

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2. Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

A. $\pi b(a - b)$

B. $\pi a(a - b)$

C. $2\pi a(a - b)$

D. $2\pi b(a - b)$.

Answer: B

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3. $\int_0^1 x(1-x)^4 dx$ is :

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

B. $\frac{1}{24}$

C. $\frac{1}{30}$

D. $\frac{1}{20}$.

Answer: C

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4. The volume when $y = \sqrt{3 + x^2}$ from x = 0 to x = 4 is rotated about x -axis is . . . . . .

A. 100π

B. $\frac{100\pi}{9}$

C. $\frac{100}{3}$

D. $\frac{100\pi}{3}$.

Answer: D

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5. $\int_0^{\frac{\pi}{2}} \log(\cot x)dx$ is :

A. 0

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

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

D. π.

Answer: A

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6. Evaluate : $\int_0^1 x(1-x)^n dx$.

A. $\frac{1}{n(n+1)}$

B. $\frac{1}{(n+1)(n+2)}$

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

D. $\frac{1}{(n+1)^2}$.

Answer: B

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7. $\int_0^{\frac{\pi}{2}} \frac{f(\sin x)}{f(\cos x)+f(\sin x)}dx$ is :

A. π

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

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

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

Answer: C

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8. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x \sin x dx$ is :

A. -1

B. -2

C. 1

D. 2

Answer: D

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9. The area of the region bounded by the curves $y = \sin x$ and $y = \cos x$ between $x = 0$ and $x = \frac{\pi}{4}$ is :

A. $\sqrt{2} - 1$

B. $\sqrt{2}+1$

C. $2\sqrt{2}$

D. $2\sqrt{2}+2$.

Answer: A

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10. The volume of the solids obtained by revolving the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ about major and minor axes in the ratio $(a>b)$.

A. b^2a^2

B. $b:a$

C. $a:b$

D. $a^2:b^2$.

Answer: B

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11. $\int_0^1 \frac{dx}{\sqrt{4-x^2}} = .$

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

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

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

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

Answer: C

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12. Evaluate $\int_0^1 \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx.$

A. $\frac{\pi^4}{32}$

B. $\frac{3\pi^4}{16}$

C. $\frac{\pi^2}{8}$

D. $\frac{\pi^4}{64}$

Answer: D

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13. $\int_0^{\infty} e^{-3x} x^4 dx = .$

A. $\frac{8}{81}$

B. $\frac{8}{9}$

C. $\frac{8}{27}$

D. $\frac{16}{27}$.

Answer: A

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14. Find the volume of the solid of revolution when the region bounded by $y = \sqrt{x}, y = 2$ and $x = 0$ is rotated about the x axis .

A. $\frac{16\pi}{5}$

B. $\frac{32\pi}{5}$

C. $\frac{8\pi}{5}$

D. $\frac{4\pi}{5}$.

Answer: B

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15. $\int_{105}^{105} \left(x^3 + 4x\right) dx$ is :

A. 1050105

B. 205105

C. 0

D. 105

Answer: c

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16. $\int_0^1 [2x]dx$ where $[]$ is the greatest integer function :

A. 1

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

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

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

Answer: D

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17. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^3 x dx}{1+\cos x} =$.

A. 0

B. 2

C. $\log 2$

D. $\log 4$.

Answer: A

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18. $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sqrt{\tan x}}$ is :

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

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

C. π

D. 0.

Answer: B

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19. $\int_0^{\frac{\pi}{2}} \sin^5 x dx = .$

A. $\frac{16}{15}$

B. $\frac{4}{15}$

C. $\frac{8}{15}$

D. $\frac{2}{15}$.

Answer: C

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20. $\int_0^{\infty} e^{-mx} x^7 dx$ is

A. $\frac{\lfloor m}{7^m}$

B. $\frac{\lfloor 7}{m^7}$

C. $\frac{\lfloor m}{7^{m+1}}$

D. $\frac{\lfloor 7}{m^8}$.

Answer: D

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21. $\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx = \ldots\ldots\ldots\ldots$

A. 0

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

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

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

Answer: A

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22. $\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx = \ldots\ldots\ldots\ldots$

A. π

B. 0

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

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

Answer: B

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23. the volume generated when the region bounded by `y=x, y=1, x=0, is rotated about y-axis is .....

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

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

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

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

Answer: C

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24. The area bounded by the parabola $x^2 = y$ and is latus rectum is :

A. $a) \frac{8}{3}$

B. b) $\frac{2}{3}$

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

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

Answer: D

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25. $\int_0^{\infty} x^6 e^{-\frac{x}{2}} dx$ is :

A. $2^7 \lfloor 6$

B. $2^6 \lfloor 6$

C. $\frac{\lfloor 6}{2^6}$

D. $\frac{\lfloor 6}{27}$.

Answer: A

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26. The volume of solid obtained by revolving $\frac{x^2}{9} + \frac{y^2}{16} = 1$ about the minor axis :

A. 48π

B. 64π

C. 32π

D. 128π.

Answer: B

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27. $\int_0^{\frac{\pi}{4}} \cos^3 2x dx = \ldots\ldots\ldots\ldots$

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

B. $\frac{2\pi}{3}$

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

D. 0.

Answer: C

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28. The value of $\int_0^{\pi} \sin^4 x dx$ is

A. $\frac{3\pi}{16}$

B. $\frac{3}{16}$

C. 0

D. $\frac{3\pi}{8}$.

Answer: D

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29. $\int_0^{\frac{\pi}{2}} e^{2x} \cos x dx$ is :

A. $\frac{e^{\pi} - 2}{5}$

B. $e^{\pi} - 2$

C. $\frac{e\pi}{5}$

D. $\frac{e^{\pi} + 2}{5}$.

Answer: A

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30. $\int_0^{\frac{3}{2}} \sqrt{9 - 4x^2} dx = .$

A. $\frac{9\pi}{4}$

B. $\frac{9\pi}{8}$

C. $\frac{9\pi}{16}$

D. $\frac{8\pi}{9}$.

Answer: B

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31. $\int_0^{\frac{\pi}{2}} \sin^7 x dx$ is :

A. $\frac{7}{12}$

B. $\frac{15}{6}$

C. $\frac{16}{35}$

D. $\frac{16}{12}$

Answer: C

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32. The area of the region bounded by $y = x^2 - 5x + 4, x = 2, x = 3$ and the x axis is :

A. $\frac{17}{6}$

B. $\frac{15}{6}$

C. $\frac{6}{13}$

D. $\frac{13}{6}$.

Answer: D

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33. Find the area of the region bounded by $x^2 = 36y$ y axis $y = 2$ and $y = 4$.

A. $8\left(4 - \sqrt{2}\right)$

B. $8\pi\left(4 - \sqrt{2}\right)$

C. $8\left(2+\sqrt{4}\right)$

D. $8\left(2+\sqrt{2}\right)$.

Answer: A

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34. Find the common area of $x^2 = y$ and $y^2 = x$.

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35. $\int_{-2}^{2}(2-x)^2 dx$ is :

A. 4

B. $\frac{32}{3}$

C. $\frac{16}{3}$

D. $\frac{64}{3}$.

Answer: D

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36. The volume of the solid formed by revolving the area of the circle $x^2 + y^2 = 9$ about y axis is :

A. 2π

B. 24π

C. 30π

D. 36π.

Answer: D

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37. The volume generated by the region bounded by the curve $y = \sqrt{x}$ and the line $x = 0$ and $x = \pi$ about x axis is :

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

B. π^3

C. $\frac{2\pi^3}{3}$

D. $\frac{\pi^2}{2}$.

Answer: A

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38. The volume generated by rotating the triangle with vertices (0,0),(4,0),(4,3) about x axis is :

A. 9π

B. 12π

C. 16π

D. 32π.

Answer: B

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39. The area bounded by $y = \cos x - \sin x$ between $x = 0$ and $x = \pi$ is :

A. a) 0

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

C. c) $\sqrt{2} - 1$

D. d) $\sqrt{2} + 1$

Answer: A

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40. The volume of solid obtained by revolving the curve $y = \sec x$ between $x = \frac{\pi}{4}$.

A. $2\pi\left(1 - \sqrt{3}\right)$

B. $2\pi\left(1 + \sqrt{3}\right)$

C. $\pi\left(1 - \sqrt{3}\right)$

D. $\frac{2\pi}{\sqrt{3+1}}$.

Answer: D

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41. The plane region bounded by the curve $y = \sqrt{\cos x}, 0 \leq x \leq \frac{\pi}{2}$ and the lines $x = 0, y = 0$ is rotated about x-axis. The volume of solid formed is :

A. a)π

B. b) π^2

C. c)$\frac{\pi}{2}$

D. d) $\frac{\pi}{4}$.

Answer: A

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42. $\int_a^b f(x)dx =$

A. $2\int_a^b f(x)dx$

B. $\int_a^b f(a-x)dx$

C. $\int_a^b f(b-x)dx$

D. $\int_a^b f(a+b-x)dx.$

Answer: D

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43. If $\int_0^a f(x)dx + \int_0^a f(2a-x)dx =$

A. $\int_0^{2a} f(x)dx$

B. $2\int_0^a f(x)dx$

C. $\int_0^{2a} f(x)dx$

D. $\int_0^{2a} f(a-x)dx.$

Answer: A

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44. The area between $x^2 = 4 - y$ and the lines $y = 0, y = 3$ is :

A. $\frac{14}{3}$

B. $\frac{28}{3}$

C. $4\sqrt{3}$

D. $\frac{56}{3}$.

Answer: A

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45. The volume of a spherical cap of height $\frac{a}{2}$ cut off from the sphere of radius a is :

A. $\frac{2}{3}\pi a^3$

B. $\frac{\pi a^3}{24}$

C. $\frac{5\pi a^3}{24}$

D. 4π.

Answer: C

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Answer The Following Questions

1. Evaluate $\int_0^2 (2x+1)dx$ as limit of a sum

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2. $\int_0^1 \frac{\left(\cos^{-1} x\right)^3}{\sqrt{1-x^2}} dx.$

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3. $\int_0^1 x(1-x)^{10} dx.$

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4. $\int_1^2 \frac{x\,dx}{(x+1)(x+2)}$.

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5. $\int_0^{\frac{\pi}{4}} \frac{dx}{9\cos^2 x + \sin^2 x}$.

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6. Prove that $\int_0^{\frac{\pi}{4}} \frac{\sin 2x dx}{\sin^4 x + \cos^4 x} = \frac{\pi}{4}$

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7. Show that $\int_0^4 \frac{x^{\frac{3}{2}}}{x^{\frac{3}{2}} + (4-x)^{\frac{3}{2}}} dx = 2.$

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8. Evaluate $\int_0^1 \sin^{-1} x + \sin^{-1}(1-x) dx.$

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9. Show that $\int_3^4 \frac{\sqrt{x}}{\sqrt{7-x}+\sqrt{x}}dx = \frac{1}{2}$

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10. Derive the reduction formula for $\int \tan^n x dx.$

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11. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{dx}{4\sin^2 x + 5\cos^2 x}$

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12. Evaluate $\int_0^1 x^5\left(\sqrt{1-x^2}\right)^3 dx$

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13. Evaluate $2\int_0^{\infty} e^{-x^2} x^9 dx.$

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14. Evaluate $\int_0^{\infty} \frac{x^3}{3^x} dx.$

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15. Find the area of the region bounded between $y^2 = 4x$ and $x^2 = 4y$.

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16. Using integration find the area of the region bounded by a triangle whose coordinates area $(-2, 0), (2, 1), (-1, 4)$.

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17. Find the area bounded by the lines $y = \sqrt{2}x, x + \sqrt{2}y = 4, y = 0$ and $y = \sqrt{2}$.

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18. The curve $4t^2 = x(x-2)^2$ is revolved about x axis find the volume generated by the loop of the curve.

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