Double integral area and length unit 3rd IIM

B.tech CSE (Lovely Professional University)

Unit – 3
Double Integral, Area & Length

1. $\int_0^3\int_1^2 xy(x+y)\,dx\,dy$ is equal to
(a) 24 (b) 16
(c) 42 (d) 21

2. $\int_0^a\int_0^b (x^2+y^2)\,dx\,dy$ is equal to
(a) $\frac{a^2b^2(a^2+b^2)}{3}$ (b) $\frac{(a^2+b^2)^2}{3}$
(c) $\frac{(a+b)(a^2+b^2)}{3}$ (d) $\frac{ab(a^2+b^2)}{3}$

3. $\int_0^1\int_y^{\sqrt{y}} (x^2+y^2)\,dy\,dx$ is equal to
(a) $2/35$ (b) $3/35$
(c) $7/35$ (d) $1/35$

4. $\int_0^1\int_0^{x^2} e^{y/x}\,dx\,dy$ is equal to
(a) 1 (b) $1/2$
(c) 0 (d) 2

5. $\int_0^1\int_0^2 (x+y)\,dx\,dy$ is equal to
(a) 0 (b) 2
(c) 3 (d) 1

6. $\int_0^a\int_0^{\sqrt{a^2-x^2}} x^2y\,dx\,dy$ is equal to
(a) $a/15$ (b) $3a/15$
(c) $a^3/15$ (d) $a^2/15$

7. $\int_0^2\int_0^{\sqrt{2x-x^2}} x\,dx\,dy$ is equal to
(a) π (b) $\pi/3$
(c) $\pi/2$ (d) $\pi/4$

8. $\int_0^1\int_0^{\sqrt{1-y^2}} 4y\,dy\,dx$ is equal to
(a) $1/3$ (b) $2/3$
(c) $7/3$ (d) $4/3$

9. $\int_1^2\int_0^{3y} y\,dy\,dx$ is equal to
(a) 7 (b) 2
(c) 1 (d) 5

10. $\int_0^a\int_0^{\sqrt{a^2-y^2}} \sqrt{a^2-x^2-y^2}\,dy\,dx$ is equal to
(a) $\pi a^2/3$ (b) $\pi a^2/6$
(c) $\pi a^2/4$ (d) $\pi a^2/5$

11. $\int_0^1\int_y^{\sqrt{y}} (x^2+y^2)\,dy\,dx$ is equal to
(a) $2/17$ (b) $3/13$
(c) $3/35$ (d) $2/35$

12. $\int_0^{\pi/2}\int_{\pi/2}^{\pi} \sin(x+y)\,dy\,dx$ is equal to
(a) 1 (b) 0
(c) 2 (d) 3

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13. $\int_0^{\pi/2}\int_{\pi/2}^{\pi}\cos(x+y)\,dy\,dx$ is equal to

(a) 2 (b) 0

(c) -2 (d) 1

14. Evaluate $\iint(x^2+y^2)\,dy\,dx$. Over the region in the positive quadrant for which $x+y\le 1$.

(a) $1/3$ (b) $1/4$

(c) $1/6$ (d) $1/5$

15. Evaluate $\iint x^2y^2\,dx\,dy$, over the region $x^2+y^2\le 1$.

(a) $\pi/24$ (b) $\pi/12$

(c) $\pi/13$ (d) $\pi/3$

16. Evaluate $\iint \frac{xy}{\sqrt{1-y^2}}\,dx\,dy$, over the positive quadrant of the circle $x^2+y^2=1$.

(a) $1/4$ (b) $1/5$

(c) $1/3$ (d) $1/6$

17. Evaluate $\iint xy\,dx\,dy$, where the region of integration is the positive quadrant of the circle $x^2+y^2=a^2$

(a) $a^2/4$ (b) $a^3/5$

(c) $a^4/8$ (d) $a^4/4$

18. Evaluate $\iint_R(x^2+y^2)\,dxdy$ over the region bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

(a) $\pi ab(a^2+b^2)/2$ (b) $\pi ab(a^2+b^2)/4$

(c) $\pi ab(a^2+b^2)/3$ (d) $\pi ab(a^2+b^2)/5$

19. Evaluate $\iint xy(x+y)\,dx\,dy$ over the area between the parabola $y=x^2$ and line $y=x$.

(a) $2/19$ (b) $4/39$

(c) $3/56$ (d) $7/22$

20. Evaluate $\iint y\,dx\,dy$, where the region of integration is the area bounded by parabolas $y^2=4ax$ and $x^2=4ay$

(a) $\frac{48}{5}a^3$ (b) $\frac{48}{5}a^2$

(c) $\frac{48}{5}a^4$ (d) $\frac{48}{5}a^7$

21. $\int_0^{\pi/2}\int_0^{a\cos\theta} r\sin\theta\,d\theta\,dr$

(a) $a^2/6$ (b) $a^2/4$

(c) $a^2/5$ (d) $a^2/7$

22. $\int_0^{\pi}\int_0^{a\cos\theta} r\,d\theta\,dr$

(a) πa^2 (b) $\pi a^2/4$

(c) $\pi a^2/2$ (d) $\pi a^2/3$

23. $\int_0^{\pi}\int_0^{a(1+\cos\theta)} r^2\cos\theta\,d\theta\,dr$

(a) $\pi a^3/2$ (b) $5\pi a^3/4$

(c) $5\pi a^3/8$ (d) $7\pi a^3/2$

24. $\int_0^{\pi/2}\int_0^{2a\cos\theta} r^2\sin\theta\cos\theta\,d\theta\,dr$

(a) $8a/15$ (b) $8a^3/15$

(c) $8a^2/17$ (d) $8a^3/17$

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25. Evaluate $\iint r^2 d\theta dr$, over the area of the circle $r = a\cos\theta$.

(a) $2a^3/17$ (b) $5a^2/7$

(c) $4a^3/9$ (d) $4a^2/7$

26. Integrate $r^2\cos\theta$ over the area of the cardioid $r = a(1+\cos\theta)$ above the initial line.

(a) $3\pi a^4/8$ (b) $7\pi a^4/8$

(c) $3\pi a^2/8$ (d) $7\pi a^2/8$

27. Evaluate $\iint \frac{rd\theta dr}{\sqrt{a^2+r^2}}$, over one loop of the lemniscates $r^2 = a^2\cos 2\theta$

(a) $\frac{(4-\pi)a^2}{3}$ (b) $\frac{(4-\pi)a}{3}$

(c) $\frac{(4-\pi)a^2}{2}$ (d) $\frac{(4-\pi)a}{2}$

28. $\int_0^1\int_0^x \frac{x^3 dx dy}{\sqrt{x^2+y^2}}$

(a) $\log(1+\sqrt{2})/2$ (b) $\log(1+\sqrt{2})/3$

(c) $\log(1+\sqrt{2})/4$ (d) $\log(1+\sqrt{2})/5$

29. $\int_0^a\int_0^{\sqrt{a^2-x^2}} y^2\sqrt{x^2+y^2}\,dx\,dy$

(a) $\pi a/10$ (b) $\pi a^5/20$

(c) $\pi a^2/10$ (d) $\pi a^3/20$

30. $\int_0^1\int_x^{\sqrt{2x-x^2}} (x^2+y^2)\,dx\,dy$

(a) $\frac{3(\pi-8)}{8}$ (b) $\frac{3(\pi-8)}{2}$

(c) $\frac{3(\pi-8)}{4}$ (d) $\frac{3(\pi-8)}{7}$

31. $\int_0^2\int_x^{\sqrt{2x-x^2}} \frac{x dx\,dy}{\sqrt{x^2+y^2}}$

(a) $1/3$ (b) $2/3$

(c) $4/3$ (d) $5/3$

32. $\int_0^a\int_0^x f(x,y)\,dx\,dy$

(a) $\int_0^a\int_y^a f(x,y)\,dy\,dx$ (b) $\int_a^0\int_x^a f(x,y)\,dy\,dx$

(c) $\int_a^0\int_x^0 f(x,y)\,dy\,dx$ (d) $\int_0^a\int_a^y f(x,y)\,dy\,dx$

33. $\int_0^1\int_x^{2x} f(x,y)\,dx\,dy$

(a) $\int_1^0\int_x^{x/2} + \int_1^2\int_{x/2}^1 f(x,y)\,dy\,dx$

(b) $\int_0^1\int_{y/2}^y + \int_1^2\int_y^{2y} f(x,y)\,dy\,dx$

(c) $\int_0^1\int_{2y}^y f(x,y)\,dy\,dx$

(d) $\int_0^1\int_{y/2}^y f(x,y)\,dy\,dx + \int_1^2\int_{y/2}^1 f(x,y)\,dy\,dx$

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34. $\int_0^4 \int_x^{2\sqrt{x}} f(x,y)\,dx\,dy$

(a) $\int_0^4 \int_a^{y^2/4} f(x,y)\,dy\,dx$

(b) $\int_4^0 \int_a^{y^{2/4}} f(x,y)\,dy\,dx$

(c) $\int_0^4 \int_{y^2/4}^{a} f(x,y)\,dy\,dx$

(d) $\int_4^0 \int_a^{y^2/4} f(x,y)\,dy\,dx$

35. $\int_0^{2a} \int_{x^2/4a}^{3a-x} f(x,y)\,dx\,dy$

(a) $\int_0^a \int_0^{\sqrt{ax}} f(x,y)dy\,dx + \int_0^{3a} \int_0^{3a-x} f(x,y)dy\,dx$

(b) $\int_0^a \int_0^{2\sqrt{ax}} f(x,y)dy\,dx + \int_0^{3a} \int_0^{3a-x} f9x,y)dy\,dx$

(c) $\int_0^a \int_0^{\sqrt{ax}} f(x,y)dy\,dx + \int_0^a \int_0^{3a-x} f(x,y)dy\,dx$

(d) $\int_0^{2a} \int_0^{\sqrt{ax}} f(x,y)dy\,dx + \int_0^a \int_0^{3a-x} f(x,y)dy\,dx$

36. $\int_0^a \int_{x^2/a}^{2a-x} f(x,y)\,dx\,dy$

(a) $\int_0^{2a} \int_0^a f(x,y)dydx + \int_0^{2a-y} \int_0^a f(x,y)dydx$

(b) $\int_0^{2a} \int_0^{\sqrt{ax}} f(x,y)dydx + \int_0^a \int_0^{2a-y} f(x,y)dydx$

(c) $\int_0^a \int_0^{\sqrt{ax}} f(x,y)dydx + \int_0^{2a} \int_0^{2a-y} f(x,y)dydx$

(d) $\int_0^a \int_0^{2\sqrt{ax}} f(x,y)dydx + \int_0^{2a} \int_0^{2a-y} f(x,y)dydx$

37. $\int_0^a \int_x^{a^2/x} f(x,y)\,dx\,dy$

(a) $\int_0^a \int_0^y + \int_0^\infty \int_0^{a^2/y} f(x,y)\,dy\,dx$

(b) $\int_0^{2a} \int_0^y + \int_0^\infty \int_0^{a^2/y} f(x,y)\,dy\,dx$

(c) $\int_0^{2a} \int_0^y + \int_0^{a^2/y} \int_0^a f(x,y)\,dy\,dx$

(d) $\int_0^{2a} \int_0^y + \int_0^{a^2/y} \int_0^{a^2} f(x,y)\,dy\,dx$

38. $\int_0^a \int_{\sqrt{a^2-x^2}}^{x+2a} f(x,y)\,dx\,dy$

Evaluate by changing order of integration(Q.39-Q.45)

39. $\int_0^\infty \int_0^x x e^{-x^2/y}\,dx\,dy$

(a) $1/2$ (b) 0

(c) 1 (d) $1/3$

40. $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x\,dx\,dy}{\sqrt{x^2+y^2}}$

(a) $\frac{1}{2}\sqrt{2}$ (b) $1-\frac{1}{2}\sqrt{2}$

(c) $-\frac{1}{2}\sqrt{2}$ (d) $2-\frac{1}{2}\sqrt{2}$

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41. $\int_0^1 \int_y^1 x^2 \cos\left(x^2 - xy\right) dydx$

(a) $\left(1-\cos 1\right)/3$ (b) $1-\cos 1$

(c) $-\cos 1/2$ (d) $\left(1-\cos 1\right)/2$

42. $\int_0^1 \int_{\sqrt{x}}^1 e^{x/y} dx\, dy$

(a) 0 (b) 1

(c) $\frac{1}{2}$ (d) -1

43. $\int_0^1 \int_y^1 e^{x^2} dy\, dx$

(a) $\frac{1}{3}(e-1)$ (b) $\frac{1}{2}(e-1)$

(c) $\frac{1}{4}(e-1)$ (d) $\frac{1}{5}(e-1)$

44. When the region of integration is the circle is $x^2 + y^2 = 2ay$. Then $\iint \sqrt{4ay - x^2}\, dx\, dy$. is equal to

(a) $\frac{1}{2}(3\pi+8)a^3$ (b) $\frac{1}{3}(3\pi+8)a^2$

(c) $\frac{1}{3}(3\pi+8)a^3$ (d) $\frac{1}{2}(3\pi+8)a^2$

45. The value of $\iint x^{l-1} y^{-l} e^{x+y} dxdy$. extended to all position values, subject to $x+y<h$. is

(a) $\frac{\pi\left(e^h-1\right)}{\sin l\pi}$ (b) $\frac{\pi\left(e^h-1\right)}{\cos l\pi}$

(c) $\frac{e^h-1}{\sin l\pi}$ (d) $\frac{e^h-1}{\cos l\pi}$

46. Evaluate $\iint \sqrt{\frac{1-\left(x^2/a^2\right)-\left(y^2/b^2\right)}{1+\left(x^2/a^2\right)+\left(y^2/b^2\right)}} dxdy$, over the positive quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

(a) $\frac{ab\pi}{2}\left(\frac{\pi}{2}-1\right)$ (b) $\frac{ab\pi}{4}(\pi-1)$

(c) $\frac{ab\pi}{3}\left(\frac{\pi}{2}-1\right)$ (d) $\frac{ab\pi}{4}\left(\frac{\pi}{2}-1\right)$

47. The area bounded by the $x-$ axis, ordinates and the curves: $y=\log_e x; x=a, x=b\left(b>a>1\right)$ is

48. The area bounded by the $x-$ axis, ordinates and the curves: $y=c\cosh\left(x/c\right): x=0, x=a\left[Catenary\right]$

49. The area bounded by the $x-$ axis, ordinates and the curves: $xy=c^2, x=a, x=b\left(a>b\right)\left[Hyperbola\right]$

50. The area bounded by the $x-$ axis, ordinates and the curves: $y=\tan x; x=-\frac{\pi}{3}, x=\frac{\pi}{3}$

(a) $2\log 1$ (b) $\log 1$

(c) $3\log 2$ (d) $2\log 2$

51. The whole area of the following curves: is $x^2+y^2=a^2$ is

(a) $2\pi a^2$ (b) πa^2

(c) πa (d) πa^3

52. The whole area of the following curves: $\left(\frac{x}{a}\right)^{2/3}+\left(\frac{y}{b}\right)^{2/3}=1\left[Hypo-cycloid\right]$

(a) $3\pi ab/8$ (b) $3\pi ab/5$

(c) $3\pi ab/7$ (d) $3\pi ab/11$

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53. The whole area of the curve: is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

(a) πa^2b^2 (b) $\pi(a+b)$

(c) πab (d) $\pi(a^2+b^2)$

54. The whole area of the curve: is $a^2y^2=x^3(2a-x)$

(a) πa (b) $2\pi a$

(c) πa^2 (d) πa^3

55. The whole area of the curve: is $a^2y^2=x^2(a^2-x^2)$

(a) $a^2/2$ (b) $a^3/3$

(c) $4a^3/2$ (d) $4a^2/3$

56. The whole area of the curve: is $a^2x^2=y^3(2a-y)$

(a) πa (b) πa^3

(c) πa^2 (d) πa^5

57. The area of the loop of the curve: is $ay^2=x^2(a-x)$

(a) $8a^2/15$ (b) $8a/15$

(c) $8a^3/15$ (d) $8a^5/15$

58. The area of the loop of the curve: $y^2(a+x)=x^2(a-x)$ [Strophoid] is

(a) $2a^2(1-\pi/4)$ (b) $2a^2(1-\pi/2)$

(c) $2a^2(1-\pi/3)$ (d) $2a^2(1-\pi/6)$

59. The area of the loop of the curve: $a^3y^2=x^4(b+x)$ is

(a) $32b^{7/2}/105a^2$ (b) $32b^{7/2}/105a^{3/2}$

(c) $35b^{7/2}/105a^{5/2}$ (d) $32b^{7/2}/105a^{3/2}$

60. The area of the loop of the curve: $a^4y^2=x^4(a^2-x^2)$ is

(a) $\pi a^2/3$ (b) $\pi a^2/4$

(c) $\pi a^2/8$ (d) $\pi a^2/2$

61. The area of the loop of the curve: $3ay^2=x(x-a)^2$ is

(a) $4a^2/15\sqrt{3}$ (b) $a^3/15\sqrt{3}$

(c) $7a^2/15\sqrt{3}$ (d) $8a^2/15\sqrt{3}$

62. The area bounded by the curves and their asymptotes: $x^2y^2=a^2(y^2-x^2)$

(a) $4a^2$ (b) a^3

(c) $7a^2$ (d) a^5

63. The area bounded by the curves and their asymptotes: $y^2(2a-x)=x^3$

(a) $2\pi a$ (b) $3\pi a^2$

(c) $2\pi a^2$ (d) $4\pi a$

64. The area bounded by the curves and their asymptotes: $x^2(x^2+y^2)=a^2(y^2-x^2)$

(a) $a^2\left(\frac{\pi}{2}+1\right)$ (b) $3a^2(\pi+1)$

(c) $2a^2\left(\frac{\pi}{2}+1\right)$ (d) $3a^2\left(\frac{\pi}{2}+1\right)$

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65. The area included between the curves: $x^2+y^2=8$ and $y^2=2x$ is
(a) $(2\pi+\sqrt{3})/2$ (b) $(2\pi+9\sqrt{3})/3$
(c) $(5\pi+9\sqrt{3})/2$ (d) $(4\pi+9\sqrt{3})/3$

66. The area included between the curves: $y^2=4ax$ and $x^2=4ay$
(a) $4a^2/3$ (b) $7a^2/3$
(c) $16a^2/3$ (d) $5a^2/3$

67. The area included between the curves: $y^2=2ax-x^2$ and $y^2=ax$
(a) $2a^2\left(\pi-\frac{2}{3}\right)$ (b) $a^2\left(\frac{\pi}{4}-\frac{2}{3}\right)$
(c) $2a^2\left(\frac{\pi}{4}-\frac{2}{3}\right)$ (d) $3a^2\left(\frac{\pi}{2}-\frac{2}{3}\right)$

68. The area included between the curves: $y^2=4a(x+a)$ and $y^2=4b(b-x)$
(a) $8(a+b)\sqrt{ab}/2$ (b) $8(a+b)\sqrt{ab}/5$
(c) $8(a+b)\sqrt{ab}/3$ (d) $8(a+b)\sqrt{a+b}/3$

69. The area included between the following curves: $x^2=4ay$ and $y(x^2+4a^2)=8a^3$
(a) $a^2(3\pi-2)/2$ (b) $2a^2(3\pi-2)/3$
(c) $2a(3\pi-2)/3$ (d) $2a^2(3\pi-2)/5$

70. The area included between the cycloid $x=a(\theta+\sin\theta), y=a(1-\cos\theta)$ and its base is
(a) $3\pi a^2$ (b) $2\pi a$
(c) $2\pi a^2$ (d) πa^2

71. The area enclosed by the curves by double integral: parabola $y=4x-x^2$ and the line $y=x$
(a) $9/2$ (b) $5/2$
(c) $7/2$ (d) $11/2$

72. The area enclosed by the curves by double integral: parabola $y=x^2$ and the line $y=x+2$
(a) $5/2$ (b) $7/2$
(c) $9/2$ (d) $11/2$

73. The area enclosed by the curves by double integral: parabola $x^2=4y$ and the line $x=4y-2$
(a) $7/24$ (b) $21/24$
(c) $11/24$ (d) $31/24$

74. The area lying between the curves $y^2=x^3$ and $y=x$ by double integrations is
(a) $1/3$ (b) $1/7$
(c) $1/10$ (d) $1/11$

75. The area between the curve and radii vectors: $r=ae^{m\theta}\quad \theta=\alpha,\theta=\beta$

76. The area between the curve and radii vectors: $\frac{1}{r}=1+\cos\theta;\quad \theta=0,\theta=\alpha$

77. The area of the curves: $r=a(1-\cos\theta)$ [cardioid]

78. The area of the curves: $r=a+b\cos\theta; a>b$ [limacon]

79. The area of the curve: $r^2=a^2\cos^2\theta+b^2\sin^2\theta$

80. The area common to the following curves:
(i) $r=a, r=a(1+\cos\theta)$
(ii) $r=a(1+\cos\theta), r=a(1-\cos\theta)$

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81. The area situated outside the circle $r = 2a\cos\theta$ and inside the cardioids $r = a(1+\cos\theta)$.

(a) $2\pi a$ (b) πa^2

(c) $\pi a^2/2$ (d) $3\pi a^2/2$

82. By double integration the area lying inside the circle $r = a\sin\theta$ and outside the cardioid $r = a(1-\cos\theta)$

(a) $a(1-\pi/4)$ (b) $a^2(1-\pi/4)$

(c) $a^5(1-\pi/4)$ (d) $a^6(1-\pi/4)$

83. The area enclosed by the curves:
$x = a\cos t + b\sin t + c;\ y = a'\cos t + b'\sin t + c'$

(a) $\pi(ab' - a'b)$ (b) $\pi(ab - a'b')$

(c) $\pi(a'b - ab')$ (d) $\pi(a'b' - ab)$

84. The area enclosed by the curves:
$x = a(3\sin t - \sin^3 t);\ y = a\cos^3 t$

(a) $7\pi a^2/3$ (b) $8\pi a^2/5$

(c) $8\pi a^2/15$ (d) $15\pi a^2/8$

85. The area enclosed by the curves:
$x = \frac{1-t^3}{1+t^2};\qquad y = \frac{2t}{1+t^2}$

(a) 0 (b) 2π

(c) π (d) 1

86. The area enclosed by the curves:
$x = a\frac{1-t^2}{1+t^2};\qquad y = \frac{2at}{1+t^2}$

(a) πa (b) πa^2

(c) $2\pi a$ (d) $\pi a^2/2$

87. The area of the loop of the curves:
$x = a\sin 2t;\qquad y = a\sin t$

(a) $2a^2/3$ (b) $7a^2/3$

(c) $4a^2/3$ (d) $5a^2/2$

88. The area of the loop of the curves:
$x = \frac{a\sin 3t}{\sin t};\qquad y = \frac{a\sin 3t}{\cos t}$

(a) $3a^2/2$ (b) $3\sqrt{3}a^2$

(c) $3\sqrt{3}a^2/3$ (d) $3\sqrt{3}a^2/2$

89. The area of the loop of the curves:
$x = \frac{3at}{1+t^3};\qquad y = \frac{3at^2}{1+t^3}$

(a) $a^2/2$ (b) $3a^2$

(c) $3a^2/2$ (d) $7a^2/2$

90. The length of the arc of the curve $y = \log\sec x$ from $x = 0$ to $x = \pi/3$

(a) $\log_e 2$ (b) $\log_e(2-\sqrt{3})$

(c) $\log_e\sqrt{3}$ (d) $\log_e(2+\sqrt{3})$

91. The length of the arc of the parabola $y^2 = 4ax$ cut off by the latus rectum is.

92. Length of the arc of the parabola $y^2 - 4y + 2x = 0$ which lies in the first quadrant.

(a) $\log(\sqrt{5}+2)$ (b) $\sqrt{5}+\log(\sqrt{5}+2)$

(c) $5+\log(\sqrt{5}+2)$ (d) $5+\log(\sqrt{5}+2)$

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93. The length of the arc of the curve $x = e^{\theta}\sin\theta, y = e^{\theta}\cos\theta$ from $\theta = 0$ to $\theta = \pi/2$.
(a) $\sqrt{2}\left(e^{\pi}-1\right)$ (b) $\sqrt{2}\left(e^{\pi/2}-2\right)$
(c) $\sqrt{2}\left(e^{\pi/2}-1\right)$ (d) $\left(e^{\pi/2}-1\right)$

94. The area of a loop of the curve $x^4 = a^2\left(x^2 - y^2\right)$ is
(a) $2a^2/3$ (b) $2a^2/5$
(c) $2a^2/7$ (d) $2a^2/9$

95. The area enclosed by the curve $xy^2 = 4(2-x)$ and $Y-$axis
(a) π (b) 2π
(c) 3π (d) 4π

96. The area common to the circle $x^2 + y^2 = 4$ and the ellipse $x^2 + 4y^2 = 9$.

97. The area of a loop of the curve $a^4 y^2 = x^4\left(a^2 - x^2\right)$.
(a) $\pi a^2/3$ (b) $\pi a^2/4$
(c) $\pi a^2/7$ (d) $\pi a^2/8$

98. The area of the infinite region between the curve $y^2(2a-x) = x^3$ and its asymptote.
(a) $3a^2\pi$ (b) $3a\pi$
(c) $3a\pi^2$ (d) $3a^2\pi^2$

99. The area enclosed by the curves $x^2 = 4ay$ and $x^2 + 4a^2 = 8a^3 / y$.
(a) $\frac{2}{3}(3\pi-2)a$ (b) $\frac{1}{3}(3\pi-2)a^2$
(c) $\frac{1}{3}(3\pi-2)a$ (d) $\frac{2}{3}(3\pi-2)a^2$

100. The area bounded by the parabola $y^2 = 4ax$ and $x^2 = 4ay$.
(a) $17a^2/2$ (b) $16a^2/3$
(c) $5a^2/2$ (d) $7a^2/2$

101. The area enclosed by the curve given by the equations $x = a\cos^3\theta, y = b\sin^3\theta$
(a) $\frac{3}{4}\pi ab$ (b) $\frac{3}{8}\pi^2 ab$
(c) $\frac{3}{7}\pi^2 a^2 b^2$ (d) $\frac{3}{8}\pi ab$

102. The area of the smaller portion enclosed by the curves $x^2 + y^2 = 9, y^2 = 8x$

103. The area of the loop of the curve $y^2 x + (x+a)^2(x+2a) = 0$
(a) $a^2(4-\pi)$ (b) $\frac{1}{3}a^2(4-\pi)$
(c) $\frac{1}{2}a^2(4-\pi)$ (d) $\frac{1}{4}a^2(4-\pi)$

104. The whole area of the curve $x^2\left(x^2+y^2\right) = a^2\left(x^2-y^2\right)$
(a) $a^2(\pi-1)$ (b) $a^2(\pi-2)$
(c) $a^2(\pi-3)$ (d) $a^2(\pi-4)$

105. The area of a loop of the curve $r = a\sin 2\theta$
(a) $\pi a^2/3$ (b) $\pi a^2/4$
(c) $\pi a^2/6$ (d) $\pi a^2/8$

106. The area of a loop of the curve $r = a\sin 3\theta$
(a) $\pi a^2/4$ (b) $\pi a^2/6$
(c) $\pi a^2/8$ (d) $\pi a^2/12$

107. The area of the cardioids $r = a(1+\cos\theta)$
(a) $3\pi a^2/2$ (b) πa^2
(c) $\pi a^2/3$ (d) $3\pi a^2/5$

108. The area outside the circle $r = 2a\cos\theta$ and inside the cardioid $r = a(1+\cos\theta)$
(a) πa^2 (b) $\pi a^2/2$
(c) $\pi a^2/3$ (d) $\pi^2 a^2/3$

109. The area of a loop of the curve $x^4 + y^2 = 2a^2 xy$.
(a) $\pi a^2/2$ (b) $\pi a^2/3$
(c) $\pi a^2/4$ (d) $\pi a^2/5$

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110. The area bounded by the curve
$\left(x^2+y^2\right)^2=a^2x^2+b^2y^2$

(a) $\frac{\pi^2\left(a^2+b^2\right)}{3}$ (b) $\frac{\pi^2\left(a^2+b^2\right)}{2}$

(c) $\frac{\pi\left(a^2+b^2\right)}{2}$ (d) $\frac{\pi\left(a^2+b^2\right)}{3}$

111. The area enclosed by the curve
$x=a\cos^3 t, y=b\sin^3 t$

(a) $3\pi ab/5$ (b) $3\pi ab/8$

(c) $3\pi a^2b^2/5$ (d) $3\pi a^2b^2/8$

112. The area enclosed by the curve
$x=a\cos t+b\sin t+c,$
$y=a'\cos t+b'\sin t+c'.$

113. The length of the cardioids $r=a(1-\cos\theta)$, lying outside the circle $r=a\cos\theta$.

(a) $4a/\sqrt{2}$ (b) $4a/\sqrt{3}$

(c) $5a/\sqrt{2}$ (d) $5a/\sqrt{3}$

114. The length of the curve defined by the equations
$x\cos\theta=a\cos(\tan\theta-\theta),$
$y\cos\theta=a\sin(\tan\theta-\theta),$
between the points for which $\theta=0$ and
$\theta=\alpha<\frac{1}{2}\pi.$

(a) $\frac{1}{2}a\tan^2\alpha$ (b) $\frac{1}{3}a\tan^2\alpha$

(c) $\frac{1}{4}a\tan^2\alpha$ (d) $\frac{1}{5}a\tan^2\alpha$

115. The arc length of the curve $y=f(x)$ lying between two points for which $x=a$ and $x=b\,(b>a)$ is given by:

(a) $\int_a^b y\,dx$ (b) $\pi\int_a^b y^2\,dx$

(c) $\int_a^b\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ (d) $\int_a^b\sqrt{1+\left(\frac{dx}{dy}\right)^2}\,dx$

116. The length of the arc of the parabola $x^2=4ay$ from the vertex to one extremity of the latus reetum is given by:

(a) $\int_0^{2a}\sqrt{1+\frac{x^2}{4a^2}}\,dx$ (b) $\int_0^{2a}\sqrt{1+\frac{4a^2}{x^2}}\,dx$

(c) $\int_0^{a}\sqrt{\frac{1+y}{a}}\,dx$ (d) $\int_0^{a}\sqrt{1+\frac{x^2}{4a^2}}\,dx$

117. The length of the arc of the curve $y=\log\sec x$ between $x=0$ and $x=\pi/6$ is equal to:

(a) $\log 3$ (b) $2\log 3$

(c) $\frac{1}{2}\log 3$ (d) None of these

118. Length of the arc of the curve
$x=e^\theta\sin\theta, y=e^\theta\cos\theta$ from $\theta=0$ to $\theta=\pi/2$ is:

(a) $e^{\pi/2}$ (b) $\sqrt{2}\left(e^{\pi/2}-1\right)$

(c) $\sqrt{2}\left(e^{\pi/2}+1\right)$ (d) $\frac{e^{\pi/2}}{\sqrt{2}}$

119. The length of the curve $y=\log\sec x$ from $x=0$ to $x=\pi/3$.

(a) $\log\left(2+\sqrt{1}\right)$ (b) $\log\left(2+\sqrt{2}\right)$

(c) $\log\left(2+\sqrt{3}\right)$ (d) $\log\left(2+\sqrt{5}\right)$

120. The length of the arc of the curve
$y=\log\tanh(x/2)$
from $x=1$ to $x=2$

(a) $\log\left[\left(e^2+1\right)/e\right]$ (b) $\log\left[\left(e^2+1\right)/e^2\right]$

(c) $\log\left[\left(e^2+1\right)/3e\right]$ (d) $\log\left[\left(e^2+1\right)/2e\right]$

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121. The length of the arc of the parabola $y^2 = 4ax$ cut off by its latus rectum.

(a) $2a\left[\sqrt{2}+\log\left(1+\sqrt{2}\right)\right]$

(b) $2a\log\left(1+\sqrt{2}\right)$

(c) $2a\left[1-\log\left(1+\sqrt{2}\right)\right]$

(d) $2a\left[\sqrt{2}-\log\left(1+\sqrt{2}\right)\right]$

122. The length of the arc of the catenary $y = c\cosh(x/c)$

(a) $c\sinh(x/c)$ (b) $c\sinh(c/x)$

(c) $c\cosh(x/c)$ (d) $c\cosh(c/x)$

123. A curve is given by the equations $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$; find the length of the arc from $\theta = 0$ to $\theta = \alpha$

(a) $\frac{1}{2}a\alpha$ (b) $a\alpha$

(c) $\frac{1}{2}a^2\alpha^2$ (d) $\frac{1}{2}a\alpha^2$

124. The length of an arc of the curve $r = ae^{\theta\cot\alpha}$ taking $s = 0$ when $\theta = 0$

125. The length of the curve $r = a\cos^3(\theta/3)$

(a) $\frac{3}{2}a\pi$ (b) $\frac{3}{2}a^2\pi^2$

(c) $\frac{3}{5}a\pi$ (d) $\frac{3}{5}a^2\pi^2$

126. The length of the loop of the curve $r = a\left(\theta^2 - 1\right)$

(a) $8a/5$ (b) $8a/3$

(c) $7a/5$ (d) $7a/3$

127. The length of the arc of the curve $x = t^2\cos t, y = t^2\sin t$

128. The length of the arc of the curve $y = x(2-x)$ as x varies from 0 to 2

129. The length of the arc of the parabola $l/r = 1+\cos\theta$

130. The length of the curve $x = e^{\theta}\sin\theta, y = e^{\theta}\cos\theta$ from $\theta = 0$ to $\theta = \pi/2$

(a) $\sqrt{2}\left(e^{\pi}-1\right)$ (b) $\left(e^{\pi/2}-1\right)$

(c) $\sqrt{2}\left(e^{\pi/2}-1\right)$ (d) $\sqrt{2}\left(e^{\pi/3}-1\right)$

131. Evaluate double integrals: $\int_1^2\int_0^{3y} y\,dy\,dx$

(a) 5 (b) 6

(c) 7 (d) 8

132. Evaluate double integrals: $\int_0^2\int_0^x \frac{1}{x^2+y^2}\,dx\,dy$

(a) $\log 2$ (b) $\frac{1}{3}\log 2$

(c) $\frac{1}{4}\log 2$ (d) $\frac{1}{5}\log 2$

133. Evaluate double integrals: $\int_0^1\int_0^{\sqrt{1+x^2}} \frac{1}{1+x^2}\,dx\,dy$

(a) $\log\left(1+\sqrt{2}\right)$ (b) $\log\sqrt{2}$

(c) $\log\left(1+\sqrt{3}\right)$ (d) $\log\sqrt{3}$

134. Evaluate double integrals: $\int_0^1\int_0^{x^2} e^{y/x}\,dx\,dy$

(a) $\frac{1}{2}$ (b) 2

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

135. Evaluate double integrals: $\int_0^2\int_0^{\sqrt{2x-x^2}} x\,dx\,dy$

(a) π (b) 2π

(c) $\pi/2$ (d) $\pi/4$

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136. Evaluate double integrals: $\int_0^1 \int_0^{\sqrt{y}} \left(x^2+y^2\right) dy\, dx$

(a) $\frac{3}{13}$ (b) $\frac{3}{25}$

(c) $\frac{3}{35}$ (d) $\frac{3}{34}$

137. Evaluate double integrals: $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{1}{1+x^2+y^2} dx\, dy$

(a) $\frac{\pi}{4}\log\sqrt{2}$ (b) $\frac{\pi}{2}\log\left(1+\sqrt{2}\right)$

(c) $\frac{\pi}{4}\log\left(1+\sqrt{2}\right)$ (d) $\frac{\pi}{2}\log\sqrt{2}$

138. Evaluate double integrals: $\int_0^{\pi/2} \int_0^{\pi/2} \cos(x+y)\, dy\, dx$

(a) -1 (b) 0

(c) 1 (d) -2

139. Evaluate double integrals:

$\int_0^a \int_0^{\sqrt{a^2-y^2}} \sqrt{a^2-x^2-y^2}\, dy\, dx$

(a) $\frac{\pi a^2}{3}$ (b) $\frac{\pi a^3}{6}$

(c) $\frac{\pi a^2}{5}$ (d) $\frac{\pi a^3}{3}$

140. Evaluate double integrals: $\int_0^{\pi} \int_0^{a\sin\theta} r\, d\theta\, dr$

(a) $\frac{\pi a^2}{3}$ (b) $\frac{\pi a^3}{4}$

(c) $\frac{\pi a^2}{4}$ (d) $\frac{\pi a^3}{6}$

141. Evaluate double integrals:

$\int_0^{\pi/2} \int_0^a r^n \sin^n\theta \cos\theta\, d\theta\, dr$, for $n+1>0$

(a) $\frac{a^n}{(n+1)}$ (b) $\frac{a^{n+1}}{n+1}$

(c) $\frac{a^{n+1}}{(n+1)^2}$ (d) $\frac{a^{n-1}}{(n+1)^2}$

142. Evaluate double integrals: $\iint \frac{r\, d\theta\, dr}{\sqrt{a^2+r^2}}$ over one loop of $r^2=a^2\cos 2\theta$

(a) $\left(2-\frac{\pi}{2}\right)a$ (b) $\left(2-\frac{\pi}{2}\right)a^2$

(c) $\left(2-\frac{\pi}{2}\right)a^3$ (d) $\left(2-\frac{\pi}{2}\right)a^4$

143. Evaluate double integrals: $\iint r^2\, d\theta\, dr$ over the area of the circle $r=a\cos\theta$

(a) $\pi a/2$ (b) $\pi a^2/2$

(c) $\pi a^3/5$ (d) $\pi a^3/9$

144. Evaluate $\iint x^2y^2\, dx\, dy$ over the region $x^2+y^2 \le 1$.

(a) $\pi/12$ (b) $\pi/6$

(c) $\pi/15$ (d) $\pi/24$

145. Evaluate $\iint_A \left(x^2+y^2\right) dx\, dy$ over the region bounded by $x=0, y=0, x+y=1$

(a) $1/2$ (b) $1/3$

(c) $1/4$ (d) $1/6$

146. Evaluate $\iint_A \frac{xy}{\sqrt{1-y^2}} dx\, dy$, where the region of integration is the positive quadrant of the circle $x^2+y^2=1$

(a) $1/2$ (b) $1/3$

(c) $1/5$ (d) $1/6$

147. Evaluate $\iint xy\, dx\, dy$ over the region in the positive quadrant for which $x+y \le 1$

(a) $7/24$ (b) $9/24$

(c) $1/24$ (d) $5/24$

148. By double integration the area of the region bounded by $y=4x-x^2$ and $y=x$

(a) $7/2$ (b) $9/2$

(c) $11/2$ (d) $5/2$

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149. The area of the region bounded by quadrant of $x^2+y^2=a^2$ and $x+y=a$

(a) $\frac{1}{4}(\pi^2-6)$ (b) $\frac{1}{4}(\pi-2)a^2$

(c) $\frac{1}{4}(\pi-2)a^3$ (d) $\frac{1}{4}(\pi-2)a^5$

150. The double integration the area of the region bounded by $y^2=x$ and $y=x$

(a) $\frac{1}{7}$ (b) $\frac{1}{8}$

(c) $\frac{1}{9}$ (d) $\frac{1}{10}$

151. The area of the loop of the curve $r=a\theta\cos\theta$ between $\theta=0$ and $\theta=\pi/2$ by double integration

(a) $\frac{\pi a^2}{16}(\pi^2-6)$ (b) $\frac{\pi a^2}{26}(\pi^2-6)$

(c) $\frac{\pi a^2}{76}(\pi^2-6)$ (d) $\frac{\pi a^2}{96}(\pi^2-6)$

152. The area of the curve $r^2=a^2\cos 2\theta$ by double integration.

(a) a^2 (b) a^3

(c) a^5 (d) a^7

153. By double integration that the area lying inside the cardioids $r=a(1+\cos\theta)$ and outside the circle $r=a$ is

(a) $\frac{1}{4}a(\pi+8)$ (b) $\frac{1}{4}a^2(\pi+4)$

(c) $\frac{1}{4}a^2(\pi+8)$ (d) $\frac{1}{4}a^3(\pi+8)$

154. The volume bounded by the paraboloid $x^2+y^2=z$ and the plane $z=4$

(a) 2π (b) 4π

(c) 6π (d) 8π

155. The volume bounded by the paraboloid $4x^2+y^2=4z$ and the plane $z=2$

(a) 2π (b) 4π

(c) 6π (d) 8π

156. The volume bounded by the coordinate planes and the plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$

(a) $\frac{abc}{2}$ (b) $\frac{abc}{3}$

(c) $\frac{abc}{5}$ (d) $\frac{abc}{6}$

157. The area of the surface $z^2=2xy$ included between planes $x=0, x=a, y=0, y=b$

Change the order of integration in the following double integral (Q. 158 to Q. 169)

158. $\int_0^a\int_0^x f(x,y)\,dx\,dy$

159. $\int_a^b\int_a^x f(x,y)\,dx\,dy$

160. $\int_0^a\int_{mx}^{lx} V(x,y)\,dx\,dy$

161. $\int_0^a\int_x^{a^2/x} f(x,y)\,dx\,dy$

162. $\int_0^b\int_0^{\sqrt{a^2-x^2}} f(x,y)\,dx\,dy$

163. $\int_0^3\int_1^{\sqrt{4-y}} (x+y)\,dy\,dx$

164. $\int_0^{2a}\int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} V\,dx\,dy$

165. $\int_0^a\int_{\frac{1}{2}\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} V\,dx\,dy$

166. $\int_0^{a/2}\int_{x^2/a}^{x-x^2/a} V\,dx\,dy$

167. $\int_0^{a/2}\int_0^{\sqrt{a^2-x^2}} f(x,y)\,dx\,dy$

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168. $\int_0^1 \int_x^{x(2-x)} f(x,y)\,dx\,dy$

169. $\int_0^{\pi/3} \int_0^{2a\cos\theta} f(r,\theta)\,r\,d\theta\,dr$

170. $\int_1^2 \int_1^{x^2} \left(x^2+y^2\right)dx\,dy$

(a) $9\frac{61}{103}$ (b) $9\frac{61}{105}$

(c) $8\frac{61}{102}$ (d) $8\frac{61}{105}$

171. $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x\,dx\,dy}{\sqrt{x^2+y^2}}$

(a) $1-\sqrt{2}$ (b) $1-\sqrt{5}$

(c) $1-\frac{\sqrt{2}}{3}$ (d) $1-\frac{\sqrt{2}}{2}$

172. Change the following integrals into polar coordinates and find the value

(i) $\int_0^a \int_y^a \frac{1}{x^2+y^2}\,dy\,dx = \frac{\pi a}{4}$;

(a) $\frac{\pi a}{2}$ (b) $\frac{\pi a}{3}$

(c) $\frac{\pi a}{4}$ (d) $\frac{\pi a}{5}$

(ii) $\int_0^1 \int_x^{\sqrt{2x-x^2}} \left(x^2+y^2\right)dx\,dy = \frac{3\pi}{8}-1$;

(a) $\frac{3\pi}{8}-1$ (b) $\frac{\pi}{8}-1$

(c) $\frac{3\pi}{8}-2$ (d) $\frac{\pi}{8}-2$

(iii) $\int_0^a \int_0^{\sqrt{a^2-x^2}} y\sqrt{x^2+y^2}\,dx\,dy = \frac{\pi a^5}{20}$

(a) $\frac{\pi a^5}{20}$ (b) $\frac{\pi a^4}{10}$

(c) $\frac{\pi a^3}{9}$ (d) $\frac{\pi a^5}{10}$

173. By using the transformation $x+y=u, y=uv$; find the value $\int_0^1 \int_0^{1-x} e^{y/(x+y)}\,dx\,dy = \frac{1}{2}(e-1)$

(a) $(e-1)$ (b) $\frac{1}{3}(e-1)$

(c) $\frac{1}{4}(e-1)$ (d) $\frac{1}{2}(e-1)$

174. Find the area enclosed by the parabolas $y^2=4ax, y^2=4bx, x^2=4cy, x^2=4dy$.

175. Transform the integral $\int_0^1 \int_x^{1/x} V\,dx\,dy$, by the substitutions $u=1+x$ and $v=xy$

176. When the region of integration R is the triangle bounded by $y=0, y=x$ and $x=1$ find $\iint_R \left(4x^2-y^2\right)dx\,dy$

(a) $\frac{1}{3}\left(\frac{\pi}{3}+\sqrt{2}\right)$ (b) $\frac{1}{3}\left(\frac{\pi}{2}+\sqrt{2}\right)$

(c) $\frac{1}{3}\left(\frac{\pi}{3}+\frac{\sqrt{3}}{2}\right)$ (d) $\frac{1}{3}\left(\frac{\pi}{3}+\frac{\sqrt{3}}{3}\right)$

177. Evaluate $\iint (x+y)^2\,dx\,dy$ over the area bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

(a) $\frac{\pi ab\left(a^2b^2\right)}{2}$ (b) $\frac{\pi ab\left(a^2+b^2\right)}{2}$

(c) $\frac{\pi ab\left(a^2+b^2\right)}{4}$ (d) $\frac{\pi ab\left(a^2b^2\right)}{4}$

178. Evaluate $\iint_R dx\,dy$, where R is the positive quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

(a) $\frac{1}{7}\pi ab$ (b) $\frac{1}{3}\pi ab$

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(c) $\frac{1}{3}\pi a^2 b^2$ (d) $\frac{1}{2}\pi a^2 b^2$

179. Evaluate $\iint_R y\,dx\,dy$, where R is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$

(a) $48/3$ (b) $48/7$

(c) $48/5$ (d) $48/11$

180. Evaluate $\iint_R y\,dx\,dy$ over the part R of the plane bounded by the line $y = x$ and the parabola $y = 4x - x^2$

(a) $54/8$ (b) $58/8$

(c) $58/4$ (d) $58/2$

181. Evaluate $\iint_R \frac{xy}{x^2+y^2}\,dx\,dy$, where R is the region of integration bounded by $y = x, y = 2x, x = 2$

(a) $\log(5/3)$ (b) $\log(5/2)$

(c) $\log(5/4)$ (d) $\log(5/6)$

182. Change the order of integration in $I = \int_0^1 \int_y^1 x^2 \cos(x^2 - xy)\,dy\,dx$ and hence evaluate it

(a) $-\cos 1$ (b) $\frac{1}{2} - \cos 1$

(c) $\frac{1}{2}(1 - \cos 1)$ (d) $\frac{1}{2}$

183. Value of $\int_1^2 \int_0^{1/2} y\,dy\,dx$ is

(a) $7/6$ (b) $1/6$

(c) $2/3$ (d) $7/3$

184. Value of $\int_1^2 \int_0^{3y} y\,dy\,dx$ is

(a) 3 (b) 5

(c) 7 (d) 9

185. Value of $\int_0^a \int_0^b (x^2 + y^2)\,dx\,dy$ is

(a) $ab(a^2 + b^2)$ (b) $\frac{1}{3}ab(a^2 + b^2)$

(c) $\frac{1}{2}ab(a^2 + b^2)$ (d) $3ab(a^2 + b^2)$

186. Value of $\int_0^1 \int_y^{\sqrt{y}} (x^2 + y^2)\,dy\,dx$ is

(a) $\frac{1}{35}$ (b) $\frac{2}{35}$

(c) $\frac{3}{35}$ (d) $\frac{4}{35}$

187. Value of $\int_0^{\pi/2} \int_0^{a\cos\theta} r\sin\theta\,d\theta\,dr$ is

(a) $\frac{1}{6}a^2$ (b) $\frac{1}{3}a^2$

(c) $\frac{1}{2}a^2$ (d) $\frac{5}{6}a^2$

188. Area lying between the parabola $y = 4x - x^2$ and the line $y = k$ is

(a) $\frac{1}{2}$ unit (b) $\frac{3}{2}$ unit

(c) $\frac{5}{2}$ unit (d) $\frac{9}{2}$ unit

189. Value of $\int_1^a \int_1^b \frac{dx\,dy}{xy}$ is:

(a) $\log(ab)$ (b) $\log(a/b)$

(c) $(\log a)\cdot(\log b)$ (d) $\frac{(\log a)}{(\log b)}$.

190. Value of $\int_0^{\pi/2} \int_{\pi/2}^{\pi} \cos(x + y)\,dy\,dx$ is:

(a) 0 (b) 2

(c) -2 (d) 1

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191. The double integral $\int_0^1\int_0^1 (x^2+y^2)\,dx\,dy$ is equal to :

(a) 0 (b) 1

(c) $\frac{1}{3}$ (d) $\frac{2}{3}$

192. If $\int_0^1\int_{2y}^2 e^x\, dxdy = k(e^4-1)$, then k equals ______

(JAM MA 2020)

193. The area bounded by the curves $x^2+y^2=2x$ and $x^2+y^2=4x$ and the straight lines $y=x$ and $y=0$ is.

(a) $3\left(\frac{\pi}{2}+\frac{1}{4}\right)$ (b) $3\left(\frac{\pi}{4}+\frac{1}{2}\right)$

(c) $2\left(\frac{\pi}{4}+\frac{1}{3}\right)$ (d) $2\left(\frac{\pi}{3}+\frac{1}{4}\right)$

(JAM MA 2020)

194. The value of the integral $\int_{y=0}^{1}\int_{x=0}^{1-y^2} y\sin\left(\pi(1-x)^2\right)dx\,dy$ is

(a) $\frac{1}{2\pi}$ (b) 2π

(c) $\frac{\pi}{2}$ (d) $\frac{2}{\pi}$ **(JAM MA 2019)**

195. The area of the part of the surface of the paraboloid $x^2+y^2+z=8$ lying inside the cylinder $x^2+y^2=4$ is

(a) $\frac{\pi}{2}\left(17^{3/2}-1\right)$ (b) $\pi\left(17^{3/2}-1\right)$

(c) $\frac{\pi}{6}\left(17^{3/2}-1\right)$ (d) $\frac{\pi}{3}\left(17^{3/2}-1\right)$

(JAM MA 2019)

196. The value of the integral $\int_{-1}^{1}\int_{-1}^{1}|x+y|dxdy$ (round off to 2 decimal places) is ________**(JAM MA 2019)**

197. The value of the integral $\int_0^1\int_x^1 y^4 e^{xy^2}\,dy\,dx$ is _____ (correct up to two decimal places). **(JAM MA 2018)**

198. The area of the parametrized surface

$$S=\left\{\left((2+\cos u)\cos v,(2+\cos u)\sin v,\sin u\right)\in\mathbb{R}^3 \,\middle|\, 0\le u\le\frac{\pi}{2}, 0\le v\le\frac{\pi}{2}\right\}$$

is _________ (correct up to two decimal places). **(JAM MA 2018)**

199. $\int_0^1\int_x^1 \sin(y^2)\,dy\,dx=$

(a) $\frac{1+\cos 1}{2}$ (b) $1-\cos 1$

(c) $1+\cos 1$ (d) $\frac{1-\cos 1}{2}$

(JAM MA 2017)

200. The area of the surface $z=\frac{xy}{3}$ intercepted by the cylinder $x^2+y^2\le 16$ lies in the interval

(a) $(20\pi,22\pi]$ (b) $(22\pi,24\pi]$

(c) $(24\pi,26\pi]$ (d) $(26\pi,28\pi]$

(JAM MA 2017)

201. Let R be the region enclosed by $x^2+4y^2\ge 1$ and $x^2+y^2\le 1$. Then the value of $\iint_R |xy|\,dx\,dy$ is ___________ **(JAM MA 2016)**

202. The value of the double integral $\int_0^{\pi}\int_0^{x}\frac{\sin y}{\pi-y}\,dy\,dx$ is______________ **(JAM MA 2016)**

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203. The area of the planar region bounded by the curves $x = 6y^2 - 2$ and $x = 2y^2$ is

(a) $\frac{\sqrt{2}}{3}$ (b) $\frac{2\sqrt{2}}{3}$

(c) $\frac{4\sqrt{2}}{3}$ (d) $\sqrt{2}$ **(JAM MA 2015)**

204. Let $f : \mathbb{R}^2 \to \mathbb{R}$ be defined by

$$f(x, y) = \begin{cases} \frac{y}{\sin y}, & y \neq 0 \\ 1, & y = 0 \end{cases}$$ Then the integral

$\frac{1}{\pi^2}\int_{x=0}^{1}\int_{y=\sin^{-1}x}^{\frac{\pi}{2}} f(x, y)\, dy\, dx$ correct upto three decimal places, is ______________ **(JAM MA 2015)**

205. The value of the integral

$\iint_D \sqrt{x^2 + y^2}\, dxdy,\ D = \{(x, y) \in \mathbb{R}^2 : x \le x^2 + y^2 \le 2x\}$

is

(a) 0 (b) $\frac{7}{9}$

(c) $\frac{14}{9}$ (d) $\frac{28}{9}$ **(JAM MA 2013)**

206. Change the order of integration in the double integral $\int_{-1}^{2}\left(\int_{-x}^{2-x^2} f(x, y)\, dy\right) dx$ **(JAM MA 2011)**

207. Evaluate $\int_{1/4}^{1}\int_{\sqrt{x-x^2}}^{\sqrt{x}} \frac{x^2 - y^2}{x^2}\, dy\, dx$ by changing the order of integration **(JAM MA 2013)**

208. Evaluate $\int_{x=0}^{4}\int_{y=\sqrt{4-x}}^{2} e^{y^3}\, dy\, dx$ **(JAM MA 2012)**

209. Find the area of the portion of the surface $z = x^2 - y^2$ in $\mathbb{R}^3$ which lies inside the solid cylinder $x^2 + y^2 \le 1$ **(JAM MA 2012)**

210. Find the area of the surface of the solid bounded by the cone $z = 3 - \sqrt{x^2 + y^2}$ and the paraboloid $z = 1 + x^2 + y^2$ **(JAM MA 2011)**

211. The value of $\iint_G \frac{ln(x^2 + y^2)}{x^2 + y^2}\, dx\, dy$, where $G = \{(x, y) \in \mathbb{R}^2 : 1 \le x^2 + y^2 \le e^2\}$, is

(a) π (b) 2π

(c) 3π (d) 4π **(JAM MA 2010)**

212. Change the order of integration in the integral $\int_0^1\int_{x-1}^{\sqrt{1-x^2}} f(x, y)\, dy\, dx$ **(JAM MA 2010)**

213. Let $F : \mathbb{R} \to \mathbb{R}$ be a continuous function and $a > 0$. Then the integral $\int_0^a\left[\int_0^x F(y)\, dy\right] dx$ equals

(a) $\int_0^a yF(y)\, dy$

(b) $\int_0^a (a - y)F(y)\, dy$

(c) $\int_0^a (y - a)F(y)\, dy$

(d) $\int_a^0 yF(y)\, dy$ **(JAM MA 2009)**

214. Evaluate $\iint_R \cos\left(\max\left\{x^3, y^{3/2}\right\}\right) dx\, dy$, where $R = [0,1] \times [0,1]$ **(JAM MA 2009)**

215. Find the surface area of the portion of the cone $z^2 = x^2 + y^2$ that is insider the cylinder $z^2 = 2y$ **(JAM MA 2008)**

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216. Let $A(t)$ denote the area bounded by the curve $y=e^{-|x|}$, the $x-$ axis and the straight lines $x=-t$ and $x=t$. Then $\lim_{t\to\infty} A(t)$ is equal to

(a) 2 (b) 1

(c) $1/2$ (d) 0 **(JAM MA 2007)**

217. Compute the double integral $\iint_D (x+2y)\,dx\,dy,$ where D is the region in the $xy-$plane bounded by the straight lines $y=x+3,\ y=x-3,\ y=-2x+4$ and $y=-2x-2.$ **(JAM MA 2007)**

218. Evaluate $\int_0^{\pi/2}\left[\int_{x/2}^{x}\frac{\sin x}{x}dx\right]dy+\int_{\pi/2}^{x}\left[\int_y^{\pi}\frac{\sin x}{x}dx\right]dy.$

(JAM MA 2007)

219. Evaluate $\iint_R xe^{y^2}\,dx\,dy,$ where R is the region bounded by the lines $x=0,\ y=1$ and the parabola $y=x^2.$ **(JAM MA 2006)**

220. Using the change of variables, evaluate $\iint_R xy\,dx\,dy,$ where the region R is bounded by the curves $xy=1, xy=3, y=3x$ and $y=5x$ in the first quadrant. **(JAM MA 2006)**

221. The length of curve $y=\frac{3}{4}x^{4/3}-\frac{3}{8}x^{2/3}+7$ from $x=1$ to $x=8$ equals

(a) $\frac{99}{8}$ (b) $\frac{117}{8}$

(c) $\frac{99}{4}$ (d) $\frac{117}{4}$ **(JAM MS 2019)**

222. The value (round off to 2 decimal places) of the double integral $\int_0^9\int_{\sqrt{x}}^3 \frac{1}{1+y^3}dydx$ equals__________

(JAM MS 2019)

223. Let

$$S=\left\{(x,y)\in\mathbb{R}^2 : x,y\ge 0,\ \sqrt{4-(x-2)^2}\le y\le\sqrt{9-(x-3)^2}\right\}$$

Then the area of S equals______________

(JAM MS 2018)

224. Let $S=\{(x,y)\in\mathbb{R}^2 : |x|+|y|\le 1\}$. Then the area of S equals____________ **(JAM MS 2018)**

225. The value of $\int_0^{\frac{\pi}{2}}\left(\int_0^x e^{\sin y}\sin x\,dy\right)dx$ equals__________________ **(JAM MS 2018)**

226. If

$$\int_{y=0}^{1}\int_{x=y}^{2-\sqrt{1-(y-1)^2}} f(x,y)\,dx\,dy=\int_{x=0}^{1}\int_{y=0}^{\alpha(x)} f(x,y)\,dy\,dx+\int_{x=1}^{2}\int_{y=0}^{\beta(x)} f(x,y)\,dy\,dx$$

then $\alpha(x)$ and $\beta(x)$ are

(a) $\alpha(x)=x, \beta(x)=1+\sqrt{1-(x-2)^2}$

(b) $\alpha(x)=x, \beta(x)=1-\sqrt{1-(x-2)^2}$

(c) $\alpha(x)=1+\sqrt{1-(x-2)^2}, \beta(x)=x$

(d) $\alpha(x)=1-\sqrt{1-(x-2)^2}, \beta(x)=x$

(JAM MS 2017)

227. The area bounded between two parabolas $y=x^2+4$ and $y=-x^2+6$ is______________________ **(JAM MS 2017)**

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228. A tangent is drawn on the curve $y = \frac{1}{3}\sqrt{x^3}, (x > 0)$ at the point $P\left(1, \frac{1}{3}\right)$ which meets the $x-$ axis at Q. Then the length of the closed curve $OQPO$, where O is the origin is________________ **(JAM MS 2017)**

229. Let $g : [0,2] \to \mathbb{R}$ be defined by $g(x) = \int_0^x (x-t)e^t dt$. The area between the curve $y = g''(x)$ and the $x-$ axis over the interval $[0,2]$ is

(a) $e^2 - 1$ (b) $2(e^2 - 1)$

(c) $4(e^2 - 1)$ (d) $8(e^2 - 1)$

(JAM MS 2016)

230. Consider a differentiable function f on $[0,1]$ with the derivative $f'(x) = 2\sqrt{2x}$. The arc length of curve $y = f(x), 0 \le x \le 1$, is ___________ **(JAM MS 2016)**

231. The value of the real number m in the following equation

$$\int_0^1 \int_x^{\sqrt{2-x^2}} (x^2 + y^2)\, dy dx = \int_{m\pi}^{\pi/2} \int_0^{\sqrt{2}} r^3 dr d\theta$$

is______________ **(JAM MS 2016)**

232. Suppose $f : \mathbb{R}^2 \to \mathbb{R}$ is a continuous function. Define $h : \mathbb{R} \to \mathbb{R}$ by $h(x) = \int_0^x \int_0^x f(u,v)\, du\, dv$.

Then $h'(1)$ is equal to

(a) $2f(1,1)$

(b) $f(1,0) + f(0,1)$

(c) $\int_0^1 f(t,t)\, dt$

(d) $\int_0^1 \left(f(1,t) + f(t,1)\right) dt$ **(JAM MS 2015)**

233. The length of the curve $y = \sqrt{4 - x^2}$ from $x = -\sqrt{2}$ to $x = \sqrt{2}$ is equal to _____________ **(JAM MS 2015)**

234. The area of the region in the first quadrant enclosed by the curves $y = 0, y = x$ and $y = \frac{2}{x} - 1$ is equal to _____________ **(JAM MS 2015)**

235. The area of the region bounded by $y = 8$ and $y = |x^2 - 1|$, is

(a) $\frac{50}{3}$ (b) $\frac{100}{3}$

(c) $\frac{110}{3}$ (d) $\frac{52}{3}$ **(JAM MS 2014)**

236. The integral $\int_0^1 \int_{x^2}^{2x} f(x,y)\, dy\, dx$ is equal to

(a) $\int_0^1 \int_{y/2}^{\sqrt{y}} f(x,y)\, dy\, dx + \int_1^2 \int_{y/2}^{1} f(x,y)\, dx\, dy$

(b) $\int_0^2 \int_y^{y/2} f(x,y)\, dx\, dy$

(c) $\int_0^1 \int_{y/2}^{\sqrt{y}} f(x,y)\, dx\, dy + \int_1^2 \int_y^{2y} f(x,y)\, dx\, dy$

(d) $\int_0^2 \int_y^{2\sqrt{y}} f(x,y)\, dx\, dy$ **(JAM MS 2014)**

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237. Let $f:[0,\infty)\to[0,\infty)$ be a twice differentiable and increasing function with $f(0)=0$. Suppose that, for any $t\ge 0$, the length of the arc of the curve $y=f(x), x\ge 0$ between $x=0$ and $x=t$ is $\frac{2}{3}\left[(1+t)^{3/2}-1\right]$. Then $f(4)$ is equal to

(a) $\frac{11}{3}$ (b) $\frac{13}{3}$

(c) $\frac{14}{3}$ (d) $\frac{16}{3}$ **(JAM MS 2013)**

238. Let $I=\int_0^1\int_{x^2}^{2-x} xy\,dy\,dx$. The change of order of integration in the integral gives I as

(a) $I=\int_0^1\int_0^{\sqrt{y}} xy\,dx\,dy+\int_1^2\int_0^{2-y} xy\,dx\,dy.$

(b) $I=\int_0^1\int_0^{2-y} xy\,dx\,dy+\int_1^2\int_0^{2-y} xy\,dx\,dy.$

(c) $I=\int_0^1\int_0^{\sqrt{y}} xy\,dx\,dy+\int_0^1\int_0^{2-y} xy\,dx\,dy.$

(d) $I=\int_0^1\int_0^{2-y} xy\,dx\,dy+\int_1^2\int_0^{\sqrt{y}} xy\,dx\,dy.$

(JAM MS 2012)

239. Let D be the triangle bounded by the $y-$axis, the line $2y=\pi$ and the line $y=x.$. Then the value of the integral $\iint_D \frac{\cos(y)}{y}dx\,dy$ is

(a) $\frac{1}{2}$ (b) 1

(c) $\frac{3}{2}$ (d) 2 **(JAM MS 2011)**

240. The value of $\frac{1}{2\pi}\int_{-\infty}^{\infty}\int_{-\infty}^{y} e^{-\frac{1}{2}\left(x^2+y^2\right)}dx\,dy$ equals

(a) $\frac{\pi}{4}$ (b) $\frac{1}{2\pi}$

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$ **(JAM MS 2010)**

241. The value of $\iint_S e^{-(x+y)}dx\,dy$, where $S=\{(x,y):0<x<1, y>0, 1<x+y<2\}$, equals

(a) 1 (b) 2

(c) $e^{-1}-e^{-2}$ (d) e^2-e

(JAM MS 2010)

242. Find the area of the smaller of the two regions enclosed between $\frac{x^2}{9}+\frac{x^2}{2}=1$ and $y^2=x$

(JAM MS 2010)

243. Evaluate $\int_1^{\infty}\int_0^{y-1} e^{\frac{-y}{x+1}-x}dxdy$ **(JAM MS 2010)**

244. The area of the region bounded by $y=x^3, x+y-2=0$ and $y=0$ is

(a) 0.25 (b) 0.5

(c) 0.75 (d) 1.0 **(JAM MS 2009)**

245. The area of the region enclosed by the curve $y=x^2$ and the straight ling $x+y=2$ is

(a) 3 (b) $\frac{27}{2}$

(c) $\frac{9}{2}$ (d) 9 **(JAM MS 2008)**

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246. By changing the order of integration, the integral $\int_0^1\int_1^{e^x} f(x,y)\,dy\,dx$ can be expressed as

(a) $\int_0^1\int_1^{\ln y} f(x,y)\,dx\,dy$ (b) $\int_0^1\int_0^{\ln y} f(x,y)\,dx\,dy$

(c) $\int_1^e\int_1^{e^y} f(x,y)\,dx\,dy$ (d) $\int_1^e\int_{\ln y}^1 f(x,y)\,dx\,dy$

(JAM MS 2007)

247. Evaluate the integral $\iint_R e^{(x^2+y^2)/2}dxdy$, where R is the region bounded by the lines $y=0$ and $y=x$, and the arcs of the circles $x^2+y^2=1$ and $x^2+y^2=2$ **(JAM MS 2007)**

248. Area enclosed by the curves $y^2=x$ and $y^2=2x-1$ lying in the first quadrant is

(a) 1 / /6 (b) $1/4$

(c) $1/2$ (d) $1/3$

(JAM CA 2005)

249. The value of $\int_0^1\int_y^1 x^2e^{xy}$ dx dy is

(a) $\frac{e+2}{2}$ (b) $\frac{e-2}{2}$

(c) $\frac{e-1}{2}$ (d) $\frac{e+1}{2}$

(JAM CA 2005)

250. The value of $\int_0^1\int_y^1 \frac{x}{(x^2+y^2)}dx\,dy$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{5}$

251. The value of the integral $\int_0^\infty\int_x^\infty \frac{e^{-y}}{y}dy\,dx$ is

(a) 0 (b) 1

(c) 2 (d) ∞

(JAM CA 06,09)

252. The entire area bounded by the curve $r^2=a\cos 2\theta$ is

(a) a (b) $2a$

(c) πa (d) $2\pi a$

(JAM CA 2006)

253. The double integral $\int_1^2\int_x^{2x} f(x,y)dydx$ under the transformation $x=u(1-v), y=uv$ is transformed into

(a) $\int_{1/2}^{2/3}\int_{1/(1-v)}^{2/(1-v)} f(u-uv,uv)dudv$

(b) $\int_{1/2}^{2/3}\int_{1/(1-v)}^{2/(1-v)} f(u-uv,uv)u\,dudv$

(c) $\int_{1/2}^{2/3}\int_{1/(1-v)}^{2/(1-v)} f(u-uv,uv)v\,dudv$

(d) $\int_{2/3}^{1}\int_{1/(1-v)}^{2/(1-v)} f(u-uv,uv)u\,dudv$

(JAM CA 2006)

254. The area bounded by the curve $y=(x+1)^2$, its tangent at $(1,4)$ and the x-axis is

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$

(c) $\frac{1}{4}$ (d) $\frac{4}{3}$

(JAM CA 2006)

255. Arc length of the curve $y=x^{3/2}, z=0$ from $(0,0,0)$ to $(4,8,0)$ is 1

(a) $\frac{8}{27}(10^{3/2}+1)$

(b) $\frac{8}{27}(10^{3/2}-2)$

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(c) $\frac{8}{27}\left(10^{3/2}-1\right)$

(d) $\frac{8}{27}\left(10^{3/2}+2\right)$

(JAM CA 2006)

256. If Ω denotes the region bounded by the x-axis and the lines $y=x$ and $x=1$, then the value of the integral $\iint_{\Omega}\frac{\cos(2x)}{x}dx\ dy$ is

(a) $\frac{\sin 2}{2}$ (b) $\frac{\cos 2}{2}$

(c) $\cos 2$ (d) $\sin 2$

(JAM CA 2007)

257. Let D the region in the first quadrant lying between $x^2+y^2=1$ and $x^2+y^2=4$. The value of the integral $\iint_{D}\sin\left(x^2+y^2\right)$ dx dy is

(a) $\frac{\pi}{4}(\cos 1-\cos 2)$

(b) $\frac{\pi}{4}(\cos 1-\cos 4)$

(c) $\frac{\pi}{2}(\cos 1-\cos 2)$

(d) $\frac{\pi}{2}(\cos 1-\cos 4)$ **(JAM CA 2007)**

258. If the line $y=mx, 0\le x\le 2$ is rotated about the line $y=-1$, then the area of the generated surface is

(a) $4\pi(1+m)\sqrt{1+m}$

(b) $4\pi\left(1+m^2\right)\sqrt{1+m}$

(c) $4\pi\left(1+\sqrt{m}\right)\sqrt{1+m^2}$

(d) $4\pi(1+m)\sqrt{1+m^2}$ **(JAM CA 2007)**

259. Let *f* be an increasing, differentiable function. If the curve $y=f(x)$ passes through $(1,1)$ and has length

$$L=\int_1^2\sqrt{\left(1+\frac{1}{4x^2}\right)}dx, 1\le x\le 2,$$

then the value is

(a) $y=\ln\left(\sqrt{x}\right)-1$

(b) $y=1-\ln\left(\sqrt{x}\right)$

(c) $y=\ln\left(1+\sqrt{x}\right)$

(d) $y=1+\ln\left(\sqrt{x}\right)$ **(JAM CA 2007)**

260. Consider the double integral $\int_0^1\int_x^{2+x}f(x,y)dy\,dx$. After reversing the order of the integration, the integral becomes

(a) $\int_0^1\int_0^{y-2}f(x,y)dx\,dy+\int_1^2\int_0^1 f(x,y)dx\,dy+\int_2^3\int_y^1 f(x,y)dx\,dy$

(b) $\int_0^1\int_0^y f(x,y)dx\,dy+\int_1^2\int_0^1 f(x,y)dx\,dy+\int_2^3\int_{y-2}^1 f(x,y)dx\,dy$

(c) $\int_0^1\int_0^1 f(x,y)dx\,dy+\int_1^y\int_0^y f(x,y)dx\,dy+\int_2^3\int_0^y f(x,y)dx\,dy$

(d) $\int_0^1\int_0^{y-2}f(x,y)dx\,dy+\int_1^2\int_0^y f(x,y)dx\,dy+\int_2^3\int_y^1 f(x,y)dx\,dy$

(JAM CA 2008)

261. The double integral $\int_0^2\int_x^{4-x}f(x,y)dy\,dx$ under the transformation $u=x+y-2x,$ is transformation into

(a) $\int_0^4\int_{u/2}^u f\left(\frac{u-v}{3},\frac{2u+v}{3}\right)dvdu$

(b) $3\int_0^4\int_{u/2}^u f\left(\frac{u-v}{3},\frac{2u+v}{3}\right)dvdu$

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(c) $\frac{1}{3}\int_0^4\int_{u/2}^{u} f\left(\frac{u-v}{3},\frac{2u+v}{3}\right)dvdu$

(d) $\frac{1}{3}\int_0^4\int_{-u/2}^{u} f\left(\frac{u-v}{3},\frac{2u+v}{3}\right)dvdu$

(JAM CA 2008)

262. The area of the region bounded by the curves $x^2=2y$ and $y^2=2x$ is

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$

(c) $\frac{4}{3}$ (d) 4 **(JAM CA 2008)**

263. Let value of the integral $\int_0^3\int_0^{\sqrt{3}x}\frac{dydx}{\sqrt{x^2+y^2}}$ is

(a) $3\log\left(2+\sqrt{3}\right)$ (b) $3\text{lo}\left(2-\sqrt{3}\right)$

(c) $3\log 2$ (d) $\frac{3}{2}\log\left(2+\sqrt{3}\right)$

(JAM CA 2008)

264. Changing the order of integration of $\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{1-x^2} f(x,y)dydx$ gives

(a) $\int_0^1\int_{\sqrt{1-y}}^{\sqrt{1+y}} f(x,y)dx\,dy+\int_{-1}^{0}\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dx\,dy$

(b) $\int_0^1\int_{-\sqrt{1-y}}^{\sqrt{1-y}} f(x,y)dx\,dy\int_1^0\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dx\,dy$

(c) $\int_0^1\int_{-\sqrt{1-y}}^{\sqrt{1-y}} f(x,y)dx\,dy+\int_{-1}^{0}\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dx\,dy$

(d) $\int_0^1\int_{\sqrt{1-y}}^{\sqrt{1+y}} f(x,y)dx\,dy-\int_{-1}^{0}\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dx\,dy$

(JAM CA 2009)

265. The value of $\iint_D [x+y]dx\,dy$, where $[x+y]$ is the greatest integer less than or equal to $x+y$ and D is the region bounded by $x=0, y=0$ and $x+y=2$ is

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$

(c) $\frac{1}{4}$ (d) 0

(JAM CA 2009)

266. The area bounded by the curves $y^2=x$ and $x^2=y$ is

(a) $1/3$ (b) $2/3$

(c) $4/3$ (d) $5/3$

(JAM CA 2009)

267. The value of the integral $\int_0^{\pi/2}\int_x^{\pi/2}\frac{\sin y}{y}dydx$

(a) 0 (b) $\frac{1}{2}$

(c) 1 (d) 2

(JAM CA 2009)

268. The area of the region bounded by the curves $r=1$ and $r^2\cos 2\theta, 0\le\theta\le\frac{\pi}{2}$, is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$ (d) $\frac{\pi}{8}$

(e) None of the above

(JAM CA 2010)

269. Let $I=\int_0^2\int_{\sqrt{4-y^2}}^{\sqrt{9-y^2}}2xy\,dx\,dy+\int_2^3\int_2^{\sqrt{9-y^2}}2xy\,dx\,dy$.

Then using the transformation $x=r\cos\theta, y=r\sin\theta,$ integral *I* is equal to

(a) $\int_0^{\pi/2}\int_0^3 r^2\sin 2\theta\,dr\,d\theta$

(b) $\int_0^{\pi/2}\int_0^2 r^3\sin 2\theta\,dr\,d\theta$

(c) $\int_0^{\pi/2}\int_2^3 r^3\sin 2\theta\,dr\,d\theta$

(d) $\int_0^{\pi/2}\int_2^3 r^2\sin 2\theta\,dr\,d\theta$ **(JAM CA 2010)**

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270. The area included between the curves
$x^2 + y^2 = a^2$ and $b^2x^2 + a^2y^2 = a^2b^2\,(a > 0, b > 0)$,
is

(a) $\frac{\pi a}{2}|a-b|$

(b) $\pi\left|a^2 - 3ab + b^2\right|$

(c) $\pi a\,|a-b|$

(d) $\pi\left|a^2 - b^2\right|$ **(JAM CA 2011)**

271. Changing the order of integration of
$\int_1^2 \int_0^x f(x,y)\,dy\,dx$ gives

(a) $\int_0^y \int_1^2 f(x,y)\,dx\,dy + \int_0^y \int_0^1 f(x,y)\,dx\,dy$

(b) $\int_0^1 \int_1^2 f(x,y)\,dx\,dy + \int_1^2 \int_y^2 f(x,y)\,dx\,dy$

(c) $\int_0^1 \int_{y/2}^y f(x,y)\,dx\,dy + \int_1^2 \int_y^{2y} f(x,y)\,dx\,dy$

(d) $\int_0^1 \int_y^1 f(x,y)\,dx\,dy + \int_1^2 \int_1^y f(x,y)\,dx\,dy$

(JAM CA 2011)

272. The area bounded by the curves $x^2 = 4 - 2y$ and $x^2 = y + 4$ is

(a) 16 (b) 24

(c) 30 (d) 36 **(JAM CA 2011)**

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