Q1. The value of $\int_0^{\pi/2} \sin^4 x \cos^6 x dx$

(a) $3\pi/312$

(b) $5\pi/512$

(c) $3\pi/512$

(d) $5\pi/312$

Purohit

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Q2. If $I_n = \int_0^{\infty} e^{-x} x^{n-1} dx$, then $\int_0^{\infty} e^{-\lambda x} x^{n-1} dx$ is equal to

(a) λI_n

(b) $\frac{1}{\lambda} I_n$

(c) $\frac{I_n}{\lambda^n}$

(d) $\lambda^n I_n$

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Q3. $\int_0^{\pi/2} \sin^7 x\,dx$ has value

(a) $\frac{37}{184}$ (b) $\frac{17}{45}$

(c) $\frac{16}{35}$ (d) $\frac{16}{45}$

(c) Dr.Gaj

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Referral Code GPSIR

Q.4. Let a,b be positive real numbers such that a < b Given that $\lim_{n\to\infty}\int_0^n e^{-t^2}\,dt = \frac{\sqrt{\pi}}{2}$ Then value of $\lim_{n\to\infty}\int_0^n \frac{1}{t^2}\left(e^{-at^2} - e^{-bt^2}\right)dt$ is

IIT JAM 2022

(a) $\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$

(b) $\sqrt{\pi}\left(\sqrt{b}+\sqrt{a}\right)$

(c) $-\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$

(d) $\sqrt{\pi}\left(-\sqrt{b}+\sqrt{a}\right)$

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Q.6. If $g(x) = \int_{x(x-2)}^{4x-5} f(t)dt$, where $f(x) = \sqrt{1+3x^4}$ for $x \in R$, then $g`(1)$ is **JAM – 2019**

(a) 6 (b) 7

(c) 8 (d) 10

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Q.7. Let f : [0 ,1] $\rightarrow$ [0, ∞) be continuous function such that $(f(t))^2 < 1 + 2\int_0^t f(s)ds$, $\forall t \in [0,1]$

IIT JAM 2021

(a) $f(t) < 1 + t \; ; \forall t \in [0,1]$

(b) $f(t) > 1 + t \; ; \forall t \in [0,1]$

(c) $f(t) = 1 + t \; ; \forall t \in [0,1]$

(d) $f(t) < 1 + t/2 \; ; \forall t \in [0,1]$

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Q.8. The value of the integral $\int_{-\pi}^{\pi} |x| \cos nx\,dx, n \geq 1$ is

JAM - 2016

(a) 0, when n is even (b) 0, when n is odd

(c) $-\frac{4}{n^2}$, when n is even (d) $-\frac{4}{n^2}$, when n is odd

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Q.9. Let $f(x) = \int_{\sin x}^{\cos x} e^{-t^2} dt$, then $f`\left(\frac{\pi}{4}\right)$ equals

IIT JAM 2006

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

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

(c) Dr. Gaj

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Q.10. Let f : R →R be continuous function if $\int_0^x f(2t)dt = \frac{x}{\pi}\sin(\pi x)$ for all x ∈ R, then f(2) is equal to **JAM 2007**

(a) -1 (b) 0

(c) 1 (d) 2

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Q.11. Let $f(x)=\int_0^x (x^2+t^2)g(t)dt$, where g is a real valued continuous function on R, then f`(x) is equal to

JAM – 2008

(a) 0

(b) $x^3g(x)$

(c) $\int_0^x g(t)dt$

(d) $2x\int_0^x g(t)dt$

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Q.12. Let a be a non-zero real number, then $\lim_{x \to a} \frac{1}{x^2 - a^2} \int_a^x \sin(t^2)\,dt$ equals **JAM – 2009**

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

(c) $-\frac{\sin(a^2)}{2a}$ (d) $-\frac{\cos(a^2)}{2a}$

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Q1. The value of the integral $\int_{-\pi}^{\pi} |x| \cos nx dx, n \geq 1$ is

JAM - 2016

(a) 0, when n is even (b) 0, when n is odd

(c) $-\frac{4}{n^2}$, when n is even (d) $-\frac{4}{n^2}$, when n is odd

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Q.2. The value of $\int_0^{\pi/4} \log(1+\tan\theta)d\theta$ is

(a) $\frac{\pi}{8}$

(b) $\log 2$

(c) $\frac{\pi}{8}\log 2$

(d) $\frac{\pi}{8}\log 3$

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Q.3. Evaluate : $\int_0^{\pi} \frac{x\,dx}{a^2\cos^2 x + b^2\sin^2 x}$

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

(b) $\frac{\pi^2}{2ab}$

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

(d) π^2

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Q.4. The limit of sum $\frac{1}{n}+\frac{1}{n+1}+\frac{1}{n+2}+.....+\frac{1}{3n}$, when $n \to \infty$ is

(a) $\log 3$

(b) $\log 2$

(c) 0

(d) 1

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Q5. The limit when n $\to\infty$ of the product

$$\left\{\left(1+\frac{1}{n}\right)\left(1+\frac{2}{n}\right)\left(1+\frac{3}{n}\right)\ldots\ldots\left(1+\frac{n}{n}\right)\right\}^{1/n}$$

(a) 2/e

(b) 4/e

(c) 5/e

(d)e

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Q6. The value : $\lim_{n\to\infty}\left[\frac{n!}{n}\right]^{1/n}$ is

(a) 1/e (b) 2/e

(c) 3/e (d)4/e

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Q.7. Evaluate $\int_0^{\infty} x^{1/4} e^{-\sqrt{x}} dx$

(a) $2\sqrt{\pi}$

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

(c) $\sqrt{\pi}$

(d) $\frac{3}{2}\sqrt{\pi}$

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Q.8. Let a,b be positive real numbers such that a < b Given that $\lim_{n\to\infty}\int_0^n e^{-t^2}\,dt = \frac{\sqrt{\pi}}{2}$ Then value of $\lim_{n\to\infty}\int_0^n \frac{1}{t^2}\left(e^{-at^2} - e^{-bt^2}\right)dt$ is

IIT JAM 2022

(a) $\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$

(b) $\sqrt{\pi}\left(\sqrt{b}+\sqrt{a}\right)$

(c) $-\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$

(d) $\sqrt{\pi}\left(-\sqrt{b}+\sqrt{a}\right)$

Dr.Gajendra Purohit (PhD,NET)
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Q9. The value of $\int_0^{\pi/2} \sin^4 x \cos^6 x dx$

(a) $3\pi/312$ (b) $5\pi/512$

(c) $3\pi/512$ (d) $5\pi/312$

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q10. If $I_n = \int_0^{\infty} e^{-x} x^{n-1} dx$, then $\int_0^{\infty} e^{-\lambda x} x^{n-1} dx$ is equal to

(a) λI_n

(b) $\frac{1}{\lambda} I_n$

(c) $\frac{I_n}{\lambda^n}$

(d) $\lambda^n I_n$

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Q11. $\int_0^{\pi/2} \sin^7 x dx$ has value

(a) $\frac{37}{184}$

(b) $\frac{17}{45}$

(c) $\frac{16}{35}$

(d) $\frac{16}{45}$

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q.1. Evaluate $\int_0^\infty x^{1/4} e^{-\sqrt{x}}\, dx$

(a) $2\sqrt{\pi}$

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

(c) $\sqrt{\pi}$

(d) $\frac{3}{2}\sqrt{\pi}$

(c) Dr.Gajendra

Dr.Gajendra Purohit (PhD,NET)
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Q2. If $I_n = \int_0^\infty e^{-x} x^{n-1} dx$, then $\int_0^\infty e^{-\lambda x} x^{n-1} dx$ is equal to

(a) λI_n

(b) $\frac{1}{\lambda} I_n$

(c) $\frac{I_n}{\lambda^n}$

(d) $\lambda^n I_n$

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Q.3. Let a,b be positive real numbers such that a < b Given that $\lim_{n\to\infty}\int_0^n e^{-t^2}dt = \frac{\sqrt{\pi}}{2}$ Then value of $\lim_{n\to\infty}\int_0^n \frac{1}{t^2}\left(e^{-at^2} - e^{-bt^2}\right)dt$ is

IIT JAM 2022

(a) $\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$ (b) $\sqrt{\pi}\left(\sqrt{b}+\sqrt{a}\right)$

(c) $-\sqrt{\pi}\left(\sqrt{b}-\sqrt{a}\right)$ (d) $\sqrt{\pi}\left(-\sqrt{b}+\sqrt{a}\right)$

Purohit

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Q4. The value of $\int_0^{\pi/2} \sin^4 x \cos^6 x dx$

(a) $3\pi/312$ (b) $5\pi/512$

(c) $3\pi/512$ (d) $5\pi/312$

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q5. $\int_0^{\pi/2} \sin^7 x dx$ has value

(a) $\frac{37}{184}$ (b) $\frac{17}{45}$

(c) $\frac{16}{35}$ (d) $\frac{16}{45}$

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q.1. The curve $ay^2 = x^2 (a - x)$ is passing through

(a) $(0, 1)$ (b) $(0, 0)$

(c) $(1, 0)$ (d) $(1, 2)$

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Q.2. The cardiod $r = a(1 + \cos\theta)$ is symmetric about

(a) $\theta = 0$ line (b) $\theta = \pi/4$ line

(c) $\theta = \pi/2$ line (d) none of these

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Q.3. The tangent at origin of the curve $2y^2 = x^2(2 - x)$ is

(a) $x = +2y$ and $x=-2y$

(b) $y = 2x$ and $y=-2x$

(c) $x = y$ and $x=-y$

(d) none of these

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Referral Code **GPSIR**

Q.1. The curve $ay^2 = x^2 (a - x)$ is passing through

(a) (0, 1) (b) (0, 0)

(c) (1, 0) (d) (1, 2)

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Referral Code GPSIR

Q.2. The cardiod $r = a(1 + \cos\theta)$ is symmetric about

(a) $\theta = 0$ line

(b) $\theta = \pi/4$ line

(c) $\theta = \pi/2$ line

(d) none of these

a Purohit

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Q.3. The tangent at origin of the curve $2y^2 = x^2(2 - x)$ is

(a) $x = +2y$ and $x=-2y$ (b) $y = 2x$ and $y=-2x$

(c) $x = y$ and $x=-y$ (d) none of these

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Q.1. The value of $\iint x e^{y^2} dx dy$, where R is the region bounded by the line x = 0, y = 1 and the parabola y = x^2. **IIT JAM-2006**

(a) $-\frac{1}{4}[e-1]$

(b) $\frac{1}{4}[e-1]$

(c) $\frac{1}{4}[e+1]$

(d) None

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Referral Code **GPSIR**

Q.2. The value of $\iint xy(x+y)dxdy$ over the area between $y^2 = x$ and $y = x$

(a) $\frac{1}{56}$ (b) $\frac{3}{56}$

(c) $\frac{5}{56}$ (d) $\frac{3}{55}$

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Referral Code GPSIR

Q.3. The value of $\iint_R xy\,dx\,dy$, where R is the quadrant of the circle $x^2 + y^2 = a^2$

(a) $a^4/8$ (b) $a^2/8$

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

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q.1. The value of $\iint xe^{y^2}dxdy$, where R is the region bounded by the line x = 0, y = 1 and the parabola y = x^2. **IIT JAM-2006**

(a) $-\frac{1}{4}[e-1]$ (b) $\frac{1}{4}[e-1]$

(c) $\frac{1}{4}[e+1]$ (d) None

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q.2. The value of $\iint xy(x+y)\,dxdy$ over the area between $y^2 = x$ and $y = x$

(a) $\frac{1}{56}$ (b) $\frac{3}{56}$

(c) $\frac{5}{56}$ (d) $\frac{3}{55}$

Dr.Gajendra Purohit (PhD,NET)
Referral Code GPSIR

Q.3. The value of $\iint_R xy\,dx\,dy$, where R is the quadrant of the circle $x^2 + y^2 = a^2$

(a) $a^4/8$ (b) $a^2/8$

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

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Referral Code GPSIR

Q.4. The value of $\iint_A xy\,dy\,dx$ where A is domain bounded by x-axis ordinate $x = 2a$ and the curve $x^2 = 4ay$.

(a) $a/7$ (b) $a^4/3$

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

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Q.5 The value of integral $\int_0^3 \int_0^{\sqrt{3}x} \frac{dydx}{\sqrt{x^2+y^2}}$.**JAM-2008**

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

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

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Q.6. The value of the integral $\iint_D \frac{\sin(2x)}{x}\,dxdy$ .where D denotes the region bounded by the x – axis and the lines y = x and x = 1.**IIT JAM 2007**

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

(c) cos2 (d) sin 2

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Q.1. The value of $\iint_A (x^2 + y^2)dA$, where A is rectangle $2 \le x \le 4$ & $0 \le y \le 1$

(a) 57/6 (b) 58/3

(c) 58/7 (d) None of these

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Q.2. The value of integral $\int_{-1}^{1}\int_{-1}^{1}|x+y|\,dx\,dy$ is **IIT JAM – 2019**

(a) 1.79 (b) 1

(c) 4.39 (d) 2.66

ohit

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Q.3. The value of $\iint_R \cos(\max\{x^3, y^{3/2}\})dxdy$, where $R = [0, 1] \times [0, 1]$. **JAM – 2009**

(a) sin 2 (b) sin 3

(c) sin 1 (d) None

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Q.4. Evaluate $\int_{\pi/2}^{\pi}\int_{0}^{x}\frac{\sin x}{x}\,dy\,dx$

(a) 0 (b) 1

(c) 2 (d) -1

Dr.Gajendra

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Q.5. The value of the integral $\int_0^1\int_0^1 (x^2 + y^2)dxdy$ **BHU 2012**

(a) 1 (b) 0

(c) ½ (d) 2/3

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Q.6. Evaluate $\int_0^1\int_0^1 \left(2x^3 e^{x^2 y}\right) dydx$ **JNU 2021**

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

(b) $e^2 - 2$

(c) $e - 2$

(d) 0

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Q.7 The value of integral $\int_0^3 \int_0^{\sqrt{3}x} \frac{dydx}{\sqrt{x^2+y^2}}$ .JAM-2008

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

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

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Q.8. The value of the integral $\iint_D \frac{\sin(2x)}{x}\,dxdy$ .where D denotes the region bounded by the x – axis and the lines y = x and x = 1.**IIT JAM 2007**

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

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

(c) cos2

(d) sin 2

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Q.1. The value of $\iint_G \frac{\log(x^2+y^2)}{x^2+y^2}dxdy$ where $G = \{(x, y) \in R^2; 1 \le x^2 + y^2 \le e^2\}$ is **IIT JAM 2010**

(a) π (b) 2π

(c) 3π (d) 4π

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Q.2. The value of $\iint \sqrt{x^2 + y^2}\, dxdy$ over the region lying in xy-plane and bounded by $x^2 + y^2 = 4$, $x^2 + y^2 = 9$

(a) $\dfrac{37\pi}{3}$ (b) $\dfrac{38}{3}\pi$

(c) $\dfrac{19}{2}\pi$ (d) $\dfrac{19}{3}\pi$

rohit

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Q.3. Let D be the region in the first quadrant lying between $x^2 + y^2 = 1$ & $x^2 + y^2 = 4$, value of integral $\iint_D \sin(x^2 + y^2)dxdy$. **IIT JAM – 2007**

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

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Q.4 If G is the region in R^2 given by

$$G = \left\{ (x, y) \in R^2 : x^2 + y^2 < 1, \frac{x}{\sqrt{3}} < y < \sqrt{3}x, x > 0, y > 0 \right\}$$

then the value of $\frac{200}{\pi} \iint_G x^2 dxdy$ is **IIT JAM 2022**

(a) 2.5 (b) 4.16

(c) 3 (d) 5.5

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Q.8. The integral $\iint\limits_R e^{x^2+y^2}\,dydx$, where R is the semicircle region bounded by the x – axis and the curve $y=\sqrt{1-x^2}$ equals **SAU 2017**

(a) $\frac{\pi}{2}(e+1)$

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

(c) $\frac{\pi}{2}(e^2)$

(d) $\frac{\pi}{2}e$

Purohit

Dr.Gajendra Purohit (PhD,NET)
Referral Code **GPSIR**

Q.1. The integral $\iint_R e^{x^2+y^2}\,dydx$, where R is the semicircle region bounded by the x – axis and the curve $y=\sqrt{1-x^2}$ equals **SAU 2017**

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

(c) $\frac{\pi}{2}(e^2)$ (d) $\frac{\pi}{2}e$

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Q.2. Let p and t be positive real numbers. Let D_t be the closed disc of radius t center (0,0) i.e. $D_t = \{(x,y) : x^2 + y^2 \leq t^2$.

Define $I(p,t) = \iint\limits_{D_t} \frac{dxdy}{\left(p^2 + x^2 + y^2\right)^p}$

Then $\lim_{t \to \infty} I(p,t)$ is finite **IIT JAM 2021**

(a) only if p > 1

(b) only if p < 1

(c) only if p = 1

(d) for no value of p

(c) Dr.Gajendra
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Q.3. The value of the real number m in the following equation

$$\int_0^1 \int_x^{\sqrt{2-x^2}} \left(x^2+y^2\right) dydx = \int_{m\pi}^{\pi/2} \int_0^{\sqrt{2}} r^3 drd\theta$$ is **IIT JAM 2016**

(a) 0 (b) 1

(c) 2 (d)1/4

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Q.4. Let $I = \int_0^2 \int_{\sqrt{4-y^2}}^{\sqrt{9-y^2}} 2xy\,dx\,dy + \int_2^3 \int_2^{\sqrt{9-y^2}} 2xy\,dx\,dy$ .IIT-JAM 2010

Then using the transformation x = r cosθ, y = r sin θ, 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) $\int_0^{\pi/2} \int_0^3 r^3 \sin 2\theta\, dr\, d\theta$

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

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Referral Code GPSIR

Q.5. The value of $\iint_D (x+2y)\,dx\,dy$, where D is region in the xy-plane bounded by the straight line $y = x + 3$, $y = x - 3$, $y = -2x + 4$ and $y = -2x + 2$. **IIT JAM – 2007**

(a) 10 (b) 11

(c) 12 (d) 13

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Q.1. The value of $\int_0^1 \int_x^1 \sin(y^2)\,dy\,dx$. **JAM – 2017**

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

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

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Referral Code GPSIR

Q2. The value of the integral $\int_{y=0}^{1}\int_{x=0}^{1-y^2} y\sin(\pi(1-x)^2)\,dx\,dy$ is

JAM-2019

(a) $\dfrac{1}{2\pi}$ (b) 2π

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

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Q.3. The value of integral $\int_0^1\int_x^1 y^4 e^{xy^2}\,dy\,dx$ is **JAM – 2018**

(a) $\dfrac{e+1}{2}$ (b) $\dfrac{e-1}{2}$

(c) $\dfrac{e-2}{3}$ (d) $\dfrac{e+2}{3}$

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Referral Code GPSIR

Q.4. The value of double integral $\int_0^{\pi}\int_0^{x}\frac{\sin y}{\pi - y}\,dydx$. **JAM-2016**

(a) 0 (b) 1

(c) 2 (d) 2π

(c) Dr.Gajendra

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Referral Code GPSIR

Q.5. The value of $\int_0^4 \int_{\sqrt{4-x}}^2 e^{y^3}\, dy dx$. **JAM-2012**

(a) $e^8 + 1$ (b) $e^8 - 1$

(c) $\dfrac{e^8 - 1}{2}$ (d) $\dfrac{e^8 - 1}{3}$

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Q.6. After the change of order of integration ,the double integral $\int_0^8 \int_{x^{1/3}}^2 dy\,dx$ becomes **CUCET 2021**

(a) $\int_{x^{1/3}}^2 \int_0^8 dx\,dy$

(b) $\int_0^2 \int_0^{y^3} dx\,dy$

(c) $\int_8^0 \int_2^{x^{1/3}} dx\,dy$

(d) $\int_0^2 \int_{y^3}^0 dx\,dy$

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Q.7. Let f : R →R be continuous function and a > 0 then the integral $\int_0^a \int_0^x f(y)\,dy\,dx$ equals

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

(c) $\int_0^a (y-a) f(y)\,dy$ (d) $\int_a^0 y f(y)\,dy$

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Q1. Change the order of integration $\int_0^1 \int_{x-1}^{\sqrt{1-x^2}} f(x,y)\,dy\,dx$.

IIT-JAM-2010

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

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

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

(d) None of these

(c) Dr.Gajendra

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Q2. The value of $\int_{0}^{\pi/2}\int_{\pi/2}^{\pi}\frac{\sin x}{x}\,dx\,dy+\int_{\pi/2}^{\pi}\int_{y}^{\pi}\frac{\sin x}{x}\,dx\,dy$

IIT-JAM-2007

(a) 0 (b) 1

(c) 2 (d) 3

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Q3. Change the order of integration in $\int_{-1}^{2}\int_{-x}^{2-x^2} f(x,y)\,dy\,dx$.

IIT-JAM – 2010

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

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

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

(d) None of these

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Q4. Change the order of $\int_0^1\int_0^{1/x} \frac{y}{(1+xy)^2(1+y^2)}\,dydx$

(a) $\int_0^1\int_0^{\infty} \frac{y}{(1+xy)^2(1+y^2)}\,dxdy + \int_1^{\infty}\int_0^{1/y} \frac{-y}{(1+xy)^2(1+y^2)}\,dxdy$

(b) $\int_0^1\int_0^{1} \frac{y}{(1+xy)^2(1+y^2)}\,dxdy + \int_1^{\infty}\int_0^{1/y} \frac{y}{(1+xy)^2(1+y^2)}\,dxdy$

(c) $\int_0^1\int_0^{1} \frac{y}{(1+xy)^2(1+y^2)}\,dxdy - \int_1^{\infty}\int_0^{1/y} \frac{y}{(1+xy)^2(1+y^2)}\,dxdy$

(d) None of these

(c) Dr. Gajendra Purohit

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Q5. Change the order of integration in $\int_0^{2a}\int_{x^2/4a}^{3a-x} f(x,y)\,dy\,dx$.

(a) $I=\int_0^{a}\int_0^{\sqrt{4ay}} f(x,y)\,dx\,dy+\int_a^{3a}\int_0^{3a-y} f(x,y)\,dx\,dy$

(b) $I=\int_0^{a}\int_0^{\sqrt{4ay}} f(x,y)\,dx\,dy-\int_a^{3a}\int_0^{3a-y} f(x,y)\,dx\,dy$

(c) $I=\int_0^{a}\int_0^{a-y} f(x,y)\,dx\,dy+\int_a^{3a}\int_0^{3a-y} f(x,y)\,dx\,dy$

(d) None of these

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Q6 Change the order of double integration $I = \int_0^1 \int_{\sqrt{y}}^{2-y} f dx dy$

(a) $I = \int_0^1 \int_0^{x^2} f dy dx - \int_1^2 \int_0^{2-x} f dy dx$

(b) $I = \int_0^1 \int_0^{x^2} f dy dx + \int_1^2 \int_0^{2-x} f dy dx$

(c) $I = \int_0^1 \int_0^{x^2} f dy dx + \int_0^{x^2} \int_0^{2-x} f dy dx$

(d) None of these

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Q7. Change the order of integration in the double integral

$$\int_{-1}^{2}\left(\int_{-x}^{2-x^2} f(x,y)dy\right)dx$$ **IIT-JAM – 2011**

(a) $I=\int_{-2}^{1}\left(\int_{-y}^{\sqrt{2-y}} f(x,y)dx\right)dy-\int_{1}^{2}\left(\int_{-\sqrt{2-y}}^{\sqrt{2-y}} f(x,y)dx\right)dy$

(b) $I=\int_{-2}^{1}\left(\int_{-y}^{\sqrt{2-y}} f(x,y)dx\right)dy+\int_{1}^{2}\left(\int_{-\sqrt{2-y}}^{\sqrt{2-y}} f(x,y)dx\right)dy$

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

(d) None of these

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Q.1. After the change of order of integration ,the double integral $\int_0^8 \int_{x^{1/3}}^2 dy dx$ becomes **CUCET 2021**

(a) $\int_{x^{1/3}}^2 \int_0^8 dx dy$

(b) $\int_0^2 \int_0^{y^3} dx dy$

(c) $\int_8^0 \int_2^{x^{1/3}} dx dy$

(d) $\int_0^2 \int_{y^3}^0 dx dy$

(c) Dr. Gajendra

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Q.2. Let f : R →R be continuous function and a > 0 then the integral $\int_0^a \int_0^x f(y)\,dy\,dx$ equals **JAM – 2009**

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

(c) $\int_0^a (y-a) f(y)\,dy$ (d) $\int_a^0 y f(y)\,dy$

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Q3. The value of $I = \int_0^1 \int_0^x x^2 e^{xy} dxdy$ is

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

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

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Q4. $\int_0^{\pi/2}\int_x^{\pi/2} \frac{\sin y}{y} dy dx$ is equal to

(a) 1 (b) 2

(c) 3 (d) 4

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Q5. The value of the double integral $\int_0^a \int_y^a \frac{x}{x^2+y^2} dxdy$ is

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

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

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Q6, If $\int_{y=0}^{1}\int_{x=0}^{y+4} dx\,dy = \int_{x=0}^{4}\int_{y=0}^{1} dy\,dx + \int_{x=4}^{5}\int_{y=g(x)}^{h(x)} dy\,dx$, then the function g(x) and h(x) are, respectively **JAM – 2009**

(a) (x – 4) and 1 (b) (x + 4) and 1

(c) 1 and (x – 4) (d) 1 and (x + 4)

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Q7. Evaluate $\iint \sqrt{4x^2 - y^2}\, dx.dy$ over region bounded by

y = 0, y = x, x = 1 is

(a) $\frac{\sqrt{3}}{6} + \frac{\pi}{9}$ (b) $\frac{\sqrt{3}}{5} + \frac{\pi}{9}$

(c) $\frac{\sqrt{2}}{3}$ (d) $\frac{\sqrt{7}}{9}$

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Q.1. The area of the planer region bounded by the curve $x = 6y^2 - 2$ and $x = 2y^2$. **IIT-JAM 2015**

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

(c) $\frac{4\sqrt{2}}{3}$ (d) $\sqrt{2}$

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Q.2. The area of $\{ (x,y) \in R^2 ; |x| + |y| \leq 2\}$ is **HCU 2021**

(a) 4 (b) 8 (c) 10

(d) 5

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Q.3. The area of the region in the first quadrant that is bounded by $y=\sqrt{x}$, $y=x-2$ and the x-axis

(a) 1/3 (b) 10

(c) 10/3 (d) 4

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Q4. Area enclosed by the curve $y^2 = x$ and $y^2 = 2x - 1$ lying in the first quadrant is **IIT JAM – 2005**

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

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

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Q.5. Consider the open rectangle $G = \{(s,t) \in R^2 : 0 < s < 1$ and $0 < t < 1\}$ and the map $T : G \to R^2$ given by $T(s,t) = \left(\dfrac{\pi s(1-t)}{2}, \dfrac{\pi(1-s)}{2}\right)$ for $(s,t) \in G$ Then the area of the image T(G) of the map T is equal to **IIT JAM 2022**

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

(c) $\pi^2/8$ (d) 1

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Q.1. Evaluate $\iiint\limits_{W} z\,dx\,dy\,dz$ where is the bounded by the plane $x = 0, y = 0, z = 0, z = 1$ and the cylinder $x^2 + y^2 = 1$ with $x \geq 0, y \geq 0$ **IIT JAM 2006**

(a) π (b) $\pi/2$

(c) $\pi/4$ (d) $\pi/8$

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Q.2. The value of $\int_{x=0}^{1}\int_{y=0}^{x^2}\int_{z=0}^{y}(y+2z)\,dz\,dy\,dx$ is **IIT JAM 2014**

(a) 1/53 (b) 2/21

(c) 1/6 (d) 5/3

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Q.3. The value of $\int_{z=0}^{1}\int_{y=0}^{z}\int_{x=0}^{y} xy^2z^3\,dx\,dy\,dz$ is **IIT JAM – 2012**

(a) 1/90 (b) 1/50

(c) 1/45 (d) 1/10

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Q.4. If the triple integral over the region bounded by the plane $2x + y + z = 4$, $x = 0$, $y = 0$, $z = 0$ is given by $\int_0^2 \int_0^{\lambda(x)} \int_0^{\mu(x,y)} dz\,dy\,dx$. Then the function $\lambda(x) - \mu(x, y)$ is

IIT JAM – 2016

(a) $x + y$ (b) $x - y$

(c) x (d) y

(c) Dr.Gajendra

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Q.5. Let V be the region bounded by the plane x = 0, x = 2, y = 0, z = 0 and y + z = 1, then the value of the integral $\iiint_V y\,dxdydz$ is **IIT JAM – 2011**

(a) 1/2 (b) 4/3

(c) 1 (d) 1/3

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Q.6. The value of the integral $\iiint\limits_V (x^2y+1)\,dx\,dy\,dz$. where V is region given by $x^2+y^2 \le 1$, $0 \le z \le 2$ is **IIT JAM 2020**

(a) π (b) 2π

(c) 3π (d) 4π

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Q.7. The value of $\iiint\limits_V \frac{dx\,dy\,dz}{\sqrt{1-x^2-y^2-z^2}}$, where V is volume of $x^2+y^2+z^2=1$.

(a) π (b) π^2

(c) $\pi/2$ (d) 8π

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Q.1. Evaluate $\iiint xyz\,dx\,dy\,dz$ taking throughout the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}\leq 1$ in which variable are positive.

(a) $\frac{abc}{8}$

(b) $\left(\frac{abc}{2}\right)^2$

(c) $\frac{abc}{4}$

(d) $\frac{a^2b^2c^2}{48}$

Q.2. Consider the region $G = \{(x,y,z) \in R^3 : 0 < z < x^2 - y^2, x^2 + y^2 < 1\}$. Then the volume of G is equal to **IIT JAM 2022**

(a) 1 (b) 0

(c) 2 (d) 1.4

(c) Dr. Pu

Q.3. Volume of the solid $\left\{(x,y,z)\in R^3 \mid 1\le x\le 2, 0\le y\le \frac{2}{x}, 0\le z\le x\right\}$ is expressible as **IIT – JAM 2017**

(a) $\int_1^2\int_0^{2/x}\int_0^x dz\,dy\,dx$ (b) $\int_1^2\int_0^x\int_0^{2/x} dy\,dz\,dx$

(c) $\int_0^2\int_1^z\int_0^{2/x} dy\,dx\,dz$ (d) $\int_0^2\int_{\max(z,1)}^2\int_0^{2/x} dy\,dx\,dz$

Q.4. If the volume of the solid in R^3 bounded by the surface by the surface $x=-1, x=1$, $y=-1$, $y=1$, $z=2$, $y^2+z^2=2$ is $\alpha-\pi$, then α equal to **IIT JAM 2018**

(a) 4 (b) 5

(c) 6 (d) 7

Q.5. The volume of the closed region bounded by the planes $x = 0, y = 0, z = 0$ and $2x + 5y + 10z = 10$ is **[JAM CA-2008]**

(a) 20/3 (b) 5

(c) 10/3 (d) 5/3

Q.6. The volume of the solid bounded by the planes $x + 2y + z = 2$, $x = 2y$, $x = 0$ and $z = 0$ is **[JAM CA 2010]**

(a) $\int_0^1 \int_0^{2-2y} \int_0^{2-x-2y} dz\, dx\, dy$

(b) $\int_0^1 \int_{x/2}^{1-\frac{x}{2}} \int_0^{2-x-2y} dz\, dy\, dx$

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

(d) $\int_0^1 \int_0^{1/2} \int_0^{2-x-2y} dz\, dx\, dy$

Q.7. The volume of the region in R^3 given by $3\,|x| + 4\,|y| + 3\,|z| \leq 12$ is **[JAM CA-2011]**

(a) 64 (b) 48

(c) 32 (d) 24

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Q.8. Find the volume of the region bounded by the plane $x = 0, y = 0, z = 0$ and $6x + 4y + 3z = 12$.

[JAM MS-2008]

(a) 1 (b) 2

(c) 3 (d) 4

Q.9. Find the finite volume enclosed by the paraboloids $z = 2 - x^2 - y^2$ and $z = x^2 + y^2$. **IIT JAM – 2007**

(a) π

(b) $-\pi$

(c) 2π

(d) None

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Q.1. The volume of the solid of revolution of the loop of the curve $y^2 = x^4(x+2)$ about the x- axis (round off to 2 decimal places) is **IIT-JAM 2019**

(a) 6.69 (b) 6.75

(c) 6.80 (d) 6.93

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Q.2 Find the volume of the solid formed by revolving the cycloid about its base.

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

(c) $6\pi^2a^3$ (d) None of these

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Q.3 Find the volume formed by the revolutation of the loop of the curve $y^2(a + x) = x^2(a - x)$ about x-axis.

(a) $\pi a^2\left[2\log 2 - \frac{4}{3}\right]$

(b) $\pi a^2\left[2\log 2 + \frac{4}{3}\right]$

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

(d) None of these

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Q.4. The volume of the solid of revolution of $y = \frac{a}{2}(e^{x/a} + e^{-x/a})$ about x-axis between x = 0 and x = b is **IIT JAM – 2009**

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

(b) $-\frac{\pi a^3}{8}(e^{2b/a} - e^{-2b/a}) + \frac{\pi a^2 b}{2}$

(c) $-\frac{\pi a^3}{8}(e^{2b/a} - e^{-2b/a}) - \frac{\pi a^2 b}{2}$

(d) $\frac{\pi a^3}{8}(e^{2b/a} - e^{-2b/a}) + \frac{\pi a^2 b}{2}$

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Q.5. Volume of the solid generated by revolving the region bounded by the lines x = 0, y = 1 and the curve $y = \sqrt{x}$ about the line y = 1 is equal to **IIT JAM – 2007**

(a) $\pi/6$ (b) $\pi/2$

(c) $5\pi/2$ (d) $3\pi/2$

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Q.1 The surface area obtained by revolving $y = 2x$, for $x \in [0, 2]$, about y-axis is **IIT JAM 2009**

(a) $2\pi\sqrt{5}$ (b) $4\pi\sqrt{5}$

(c) $2\sqrt{5\pi}$ (d) $4\sqrt{5\pi}$

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Q.2. The surface area of the portion of the plane $y + 2z = 2$ within the circle $x^2 + y^2 = 3$ is **IIT JAM – 2016**

(a) $\frac{3\sqrt{5}}{2}\pi$ (b) $\frac{5\sqrt{5}}{2}\pi$

(c) $\frac{7\sqrt{5}}{2}\pi$ (d) $\frac{9\sqrt{5}}{2}\pi$

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Q.3. The area of the surface $z = \frac{xy}{3}$ intercepted by the cylinder $x^2 + y^2 \le 16$ lies in the interval **IIT JAM 2017**

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

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

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Q.4. 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

IIT JAM – 2019

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

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

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Q.5. Find the area of the portion of the surface $z = x^2 - y^2$ in R^3 which lies inside the solid cylinder $x^2 + y^2 \leq 1$.

IIT JAM – 2012

(a) $\frac{\pi}{6}[5^{3/2} - 1]$ (b) $\frac{\pi}{6}[13^{3/2} - 1]$

(c) $\frac{\pi}{3}[5^{3/2} - 1]$ (d) $\frac{\pi}{2}[5^{3/2} - 1]$

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Q.6. Find the surface area generated by the revolution of the cardioid $r = a(1 + \cos\theta)$ about the initial line.

(a) $\frac{72}{5}\pi a^2$ (b) $\frac{64}{5}\pi a^2$

(c) $\frac{32}{5}\pi a^2$ (d) None

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Q.7. Find the surface area of the portion of the cone $z^2 = x^2 + y^2$ that is inside the cylinder $z^2 = 2y$. **IIT JAM – 2008**

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

(c) $6\sqrt{2}\pi$ (d) $8\sqrt{2}\pi$

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