DEPARTMENT OF MATHEMATICS

Semester – I : 060090105 - CC1 Differential and Integral Calculus

Question Bank

Unit-1	Differential calculus : Hyperbolic functions
[A]	**5 – Marks Questions**
1.	Rewrite the expression in terms of exponential forms and simplify the results as much as you can. a) $2\cosh(\ln x)$ b) $\sinh(2\ln x)$
2.	Rewrite the expression in terms of exponential forms and simplify the results as much as you can. a) $\cosh 7x + \sinh 7x$ b) $(\sinh x + \cosh x)^2$
3.	Prove the identities a) $\sinh 2x = 2\sinh x \cosh x$. b) $\cosh^2 x + \sinh^2 x$.
4.	Find the derivatives of y with respect to the appropriate variable. a) $y = 6\sinh\frac{x}{3}$ b) $y = 2\sqrt{t}\tanh\sqrt{t}$
5.	Find the derivatives of y with respect to the appropriate variable. a) $y = \ln(\sinh z)$ b) $y = \ln\cosh v - \frac{1}{2}\tanh^2 v$
6.	Find the derivatives of y with respect to the appropriate variable. a) $y = \sinh^{-1}\sqrt{x}$ b) $y = \cosh^{-1}x - x\,\mathrm{sech}^{-1}x$
7.	Find the derivatives of y with respect to the appropriate variable. a) $y = (1-\theta)\tanh^{-1}\theta$ b) $y = \sinh^{-1}(\tan x)$
8.	Evaluate the integrals a) $\int \sinh 2x\,dx$ b) $\int \tanh\frac{x}{7}\,dx$
9.	Evaluate the integrals a) $\int \mathrm{sech}^2(x-\frac{1}{2})\,dx$ b) $\int_0^{\ln 2} 4e^x \sinh x\,dx$
10.	Evaluate the integrals a) $\int_0^{2\sqrt{3}} \frac{dx}{\sqrt{4+x^2}}$ b) $\int_{\frac{5}{4}}^{2} \frac{dx}{1-x^2}$
11.	If $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$, find $\frac{d^2y}{dx^2}$.
12.	If $P^2 = a^2\cos^2\theta + b^2\sin^2\theta$, prove that $P + \frac{d^2P}{d\theta^2} = \frac{a^2b^2}{P^3}$.
13.	If $y = \sin(\sin x)$, prove that $\frac{d^2y}{dx^2} + \tan x\frac{dy}{dx} + y\cos^2 x = 0$
14.	If $y = a\cos(\log x) + b\sin(\log x)$, show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$
15.	If $x = \sin t, y = \sin pt$ then prove that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2y = 0$.

16.	If $y = e^{-x}(A\cos x + B\sin x)$, prove that $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 0$
17.	If $y = Ae^{px} + Be^{qx}$, show that $\frac{d^2y}{dx^2} - (p+q)\frac{dy}{dx} + pqy = 0$
18.	If $x = \log \emptyset, y = \emptyset^2 - 1$. Find $\frac{d^2y}{dx^2}$.
19.	Find $(x^2e^x\cos x)_n$ by Leibnitz's theorem.
20.	Find $y_n(0)$ when $y = \log(x + \sqrt{1+x^2})$
21.	Find the first and second derivatives of the functions a) $s = \frac{t^2+5t-1}{t^2}$ b) $w = 3z^7 - 7z^3 + 21z^2$
22.	Find the first and second derivatives of the functions a) $w = 2p^5 - 7p^3 + 21p^2 + 12p + 6$ b) $z = \sin y + y\cos y$
23.	Use Leibniz's rule to find the derivatives of the functions a) $\int_{x^3}^{x^2}(1+t^2)^{-3}dt$ b) $\int_{\cos x}^{\sin x}\frac{1}{1-t^2}dt$
Unit-2	**Differential calculus : L'Hospital's rule**
[A]	**5 – Marks Questions**
1.	Explain the following terms: a) Point of inflexion. b) Concave upwards.
2.	Explain the following terms: a) Convex downwards. b) Concave downwards.
3.	Find the ranges of values of x for which the curve $y = x^4 - 6x^3 + 12x^2 + 5x + 7$ $y = 3x^5 - 40x^3 + 3x - 20$
4.	Show that the curve $(a^2 + x^2)y = a^2x$ has three point of inflexion.
5.	Find the point of inflexion on the curve a) $y = ax^3 + bx^2 + cx + d$ b) $x = 3y^4 - 4y^3 + 5$
6.	c) $x = (y-1)(y-2)(y-3)$ d) $y = \frac{(x^3-x)}{3x^2+1}$
7.	Show that the curve $ay^2 = x(x-a)(x-b)$ has two and, only two point of inflexion.
8.	Determine the limit of the following (0/0) a) $\lim_{x\to1}\frac{1+\log x - x}{1-2x+x^2}$ b) $\lim_{x\to0}\frac{\sinh x - x}{\sin x - x\cos x}$
9.	Determine the limit of the following (0/0) a) $\lim_{x\to0}\frac{a^x-1-x\log_e a}{x^2}$ b) $\lim_{x\to0}\frac{a^x-b^x}{x}$
10.	Determine the limit of the following (∞/∞) a) $\lim_{x\to a}\frac{\log(x-a)}{\log(e^x-e^a)}$

	b) $\lim_{x\to\frac{\pi}{2}} \frac{\tan 3x}{\tan x}$
11.	Determine the limit of the following $0*\infty$ a) $\lim_{x\to 0} x\log x$ b) $\lim_{x\to 0} x\log\tan x$
12.	Determine the limit of the following $\infty - \infty$ a) $\lim_{x\to 0}\left(\frac{1}{x^2}-\frac{1}{\sin^2 x}\right)$ b) $\lim_{x\to 2}\left\{\frac{1}{x-2}-\frac{1}{\log(x-1)}\right\}$
13.	Prove that the following: a) $\lim_{x\to 0}(a^x+x)^{\frac{1}{x}} = ae.$ b) $\lim_{x\to 0}\left(\frac{a^x+b^x}{2}\right)^{\frac{1}{x}} = \sqrt{ab}$
14.	Prove that the following: a) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{\frac{1}{x}} = \sqrt[3]{abc}$ b) $\lim_{x\to\infty}\left(\frac{a^{\frac{1}{x}}+b^{\frac{1}{x}}+c^{\frac{1}{x}}+d^{\frac{1}{x}}}{4}\right)^{x} = \sqrt[4]{abcd}$
15.	Prove that the following: a) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}} = e^{\frac{1}{3}}$ b) $\lim_{x\to 0}\left(\frac{\sinh x}{x}\right)^{\frac{1}{x^2}} = e^{\frac{1}{6}}$
16.	Trace the curve : $y = x^3 - 12x - 16$
17.	Trace the curve : $y = -\frac{3}{2}x^4 + 4x^3 + 3x^2 - 12x.$
18.	Trace the curve : $y = \frac{8a^3}{x^2+4a^2}$
19.	Trace the curve : $y^2(a^2+x^2) = x^2(a^2-x^2)$
20.	Trace the curve : $y^2x^2 = x^2 - a^2$
21.	Trace the curve with parametric equation : $x = a\cos^3\theta$, $y = b\sin^3\theta$
22.	Trace the curve with parametric equation : $x = a(\theta+\sin\theta), y = a(1+\cos\theta)$
23.	Trace the curve : $r = a(1+\cos\theta)$
24.	Trace the curve : $r = a\sin 3\theta$
25.	Find limit of $f(x) = \frac{e^x-e^{-x}-2x}{x^2\sin x}$, where $x \to 0$
26.	Prove that , $\lim_{x\to 0}\left(\frac{1}{x}\right)^{1-\cos x} = 0$
27.	Prove that , $\lim_{x\to 0}(1+\sin x)^{\cot x} = e$
28.	Evaluate $\lim_{x\to\frac{\pi}{2}}(\cos x)^{\cos x}$
29.	Determine the values of the following (a) $\lim_{x\to 0}\frac{\log\tan x}{\log x}$, (b) $\lim_{x\to 0}\frac{\log\sin 2x}{\log\sin x}$
Unit-3	**Integral Calculus**
[A]	**1 – Mark Questions**
1.	Write the formula for integration by part.

2.	Evaluate the integral $\int x \sin\frac{x}{2}\ dx$
3.	Give the expression of $\int sin^n x\, dx$
4.	Give the expression of $\int \sin mx \cos nx\ \ dx$
5.	Give the expression of $\int \cos mx \cos nx\ \ dx$
6.	Give the expression of $\int cos^n x\, dx$
7.	Evaluate the integral $\int x^2\, sinx\ \ dx$
8.	Evaluate the integral $\int t^2\, cost\, dt$
9.	Evaluate the integral $\int x\, e^x\ \ dx$
10.	Evaluate the integral $\int x\, sec^2 x\ \ dx$
11.	Evaluate the integral $\int x^2 e^{-x}\ \ dx$
12.	Evaluate the integral $\int e^{\theta}\, sin\theta\, d\theta$
13.	Evaluate the integral $\int e^{-2x}\, sin2x\, dx$
14.	Evaluate the integral $\int e^{-x} \cos x\ \ dx$
15.	What is the formula to find volume of a solid by Slicing method?
16.	Give the formula of Disk method to find the volume of a solid revolute about x-axis.
17.	Write formula of Washer method to find the volume of a solid revolute about x-axis.
18.	Write formula of Cylindrical Shell method to find the volume of a solid revolute about x-axis.
[B]	**3 – Marks Questions**
1.	Answer the following: $\int 3\sec^4 3x\ \ dx$
2.	Answer the following: $\int$ cos3x cos4x dx
3.	Answer the following: $\int \sec^3 x\, tanx\ \ dx$
4.	Answer the following: $\int sin3x\ \cos 2x\, dx$
5.	Answer the following: $\int_0^{\pi/2} sinx\, cosx\, dx$
6.	Answer the following: $\int secx \tan^2 x\ \ dx$
7.	Answer the following: $\int \sec^2 x\ \tan x\, dx$
8.	Answer the following: $\int sin2x\ \cos 3x\, dx$
9.	Answer the following: $\int \sin^3 x\, cos^3 x\, dx$
10.	Answer the following: $\int sin^3 x\ \ cos2x\ \ dx$
11.	Answer the following: $\int \sin^4 x$ cos2x dx
12.	Answer the following: $\int \cos^3 x\, sin2x\, dx$
13.	Answer the following: $\int$ cos^{3}4x dx
14.	Answer the following: $\int \cos^2 2x\ sinx\ \ dx$
15.	Answer the following: $\int$ sin^{3}x dx
16.	Answer the following: $\int_{-\pi}^{\pi} sin3x\, cos3x\, dx$
17.	Answer the following: $\int$ cos^{3}x $sinx\, dx$
18.	Answer the following: $\int \sin^2 x\, cos3x\, dx$
19.	Answer the following: $\int \cos 2x\, dx$
20.	Answer the following: $\int_{-\pi/2}^{\pi/2} cosx\, cos7x$
21.	Answer the following: $\int t^2\ e^{4t}\, dt$
[C]	**5 – Marks Questions**
1.	The base of a solid is the region bounded by the graphs of y=3x, y = 6 and x =0. The cross-sections perpendicular to the x-axis are rectangular of height 10.

2.	Find the volume of solids generated by revolving the region by the lines and curves about x -axis: $y = x^2$, y = 0 and x = 2.
3.	Find the volume of solids generated by revolving the regions bounded by the lines and curves about x – axis. $Y = 2\sqrt{x}$, y = 2 and x = 0.
4.	Using integration by parts to establish the reduction formula; $\int x^n \cos x\, dx = x^n \sin x - n\int x^{n-1} \sin x\; dx$
5.	Find the volume of solids generated by revolving the regions bounded by the lines and curves about x – axis. y= x, y = 1 and x = 0.
6.	Use shell method to find the volume of the solids generated by revolving the regions bounded by the curves and lines about y-axis. y = 2x, y = x/2 and x = 1.
7.	The base of a solid is the region bounded by the graphs of $y = \sqrt{x}$ and y =x/2. The cross section perpendiculars to the x-axis are isosceles triangle of height 6.
8.	Find the volume of solids generated by revolving the region by the lines and curves about y -axis: x = 2/(y+1) , x= 0, y = 0, y = 3.
9.	Use shell method to find the volume of the solids generated by revolving the regions bounded by the curves and lines about y-axis. y = x, y = -x/2 and x = 2.
10.	Using integration by parts to establish the reduction formula; $\int x^n \sin x\, dx = -x^n \cos x + n\int x^{n-1} \cos x\; dx$
11.	Find the volume of solids generated by revolving the region by the lines and curves about y -axis: $x = \sqrt{2\sin 2y}$, $0 \le y \le \pi/2$, x = 0.
12.	Find the volume of solids generated by revolving the regions bounded by the lines and curves about x – axis. $y= x^2 + 1$, y = x + 3.
13.	Using integration by parts to establish the reduction formula; $\int x^n e^{ax} dx = \frac{x^n e^{ax}}{a} - \frac{n}{a}\int x^{n-1} e^{ax}\; dx\;,\quad a \neq 0$
14.	Find the volume of solids generated by revolving the region by the lines and curves about y -axis: $x = y^{3/2}$, x= 0 and y = 2.
15.	Find the volume of solids generated by revolving the regions bounded by the lines and curves about x – axis. $y= 4 - x^2$, y = 2 – x.
16.	Using integration by parts to establish the reduction formula; $\int (\ln x)^n\; dx = x\,(\ln x)^n - n\int (\ln x)^{n-1}\; dx$
17.	Find the volume of solids generated by revolving the region by the lines and curves about y -axis: $x = \sqrt{5}\, y^2$, x= 0, y = -1, y = 1.
18.	Find the volume of solids generated by revolving the region about y –axis: Region enclosed by the triangle with vertices (1,0), (2,1) and (1,1).
19.	The base of a solid is the region bounded by the graphs of $y = \sqrt{x}$ and y =x/2. The cross section perpendiculars to the x-axis are semi-circles with diameter running across the base of the solid.
20.	Find the volume of solids generated by revolving the region by the lines and curves about x -axis: $y = \sqrt{\cos x}$ $\;0 \le x \le \frac{\pi}{2}$, y = 0 and x=0.
21.	Find the volume of solids generated by revolving the region about y –axis: Region enclosed by the triangle with vertices (0,1), (1,0) and (1,1).
22.	The solid is lies between planes perpendicular to the x-axis at x = -1 and x = 1. The

	cross sections perpendicular to the x-axis between these plane are squares whose bases run from the semi-circle $y = -\sqrt{1-x^2}$ to the semi-circle $y = \sqrt{1-x^2}$.
23.	Find the volume of solids generated by revolving the region by the lines and curves about x -axis: $y = x - x^2$ and $y = 0$.
24.	Find the volume of solids generated by revolving the region about y –axis: Region in the first quadrant bounded above by the parabola $y = x^2$, below by the x-axis, and on the right by the line $x = 2$
25.	Find the volume of solids generated by revolving the region by the lines and curves about x -axis: $y = \sqrt{9-x^2}$ and $y = 0$.
26.	Find the volume of solids generated by revolving the region about y –axis: Region in the first quadrant bounded on left by the circle $x^2+y^2 = 3$, on the right by the line $x = \sqrt{3}$ and above by the line $y = \sqrt{3}$.
27.	Find the volume of solids generated by revolving the region by the lines and curves about x-axis: $y = x^3$, $y = 0$ and $x = 2$.
28.	Find the volume of solids generated by region in the first quadrant bounded above by the curve $y = x^2$, below by the x-axis, and on the right by the line $x = 1$, about the line $x = -1$.
29.	Use shell method to find the volume of the solids generated by revolving the regions bounded by the curves and lines about y-axis. $y = x^2$, $y = 2 – x$ and $x = 0$.
Unit-4	**Multiple Integral and its application:**
[A]	**1 – Mark Questions**
1.	Write the formula of length (arc length) for curve y=f(x).
2.	What is the Fubini's theorem (First form) to find volume of a solid?
3.	Write the formula of length (arc length) for curve x=g(y).
4.	What is the Fubini's theorem (stronger form) to find volume of a solid over general region?
5.	Write a formula for area of surface generated revolving the graph of y = f(x) about x –axis.
6.	How to find the average value of function f over region R.
7.	Write a formula for area of surface generated revolving the graph of x = g(y) about y –axis.
8.	Give the formula to find the area of closed bounded region R in polar coordinate plane.
9.	Find the length of arc $x = (y^4/4) + 1/(8y^2)$, from y=1 to y=2.
10.	How to find the volume of a closed bounded region D in space using triple integration
11.	Sketch the region bounded by the given lines and curves. The coordinates of axes and the line $x + y = 2$.
12.	Write the formula of length (arc length) for curve y=f(x).
13.	Write the formula to derive average value of function F over a region D in space.
14.	Sketch the region bounded by the given lines and curves. The lines $x = 0$, $y = 2x$ and $y = 4$.
15.	Sketch the region bounded by the given lines and curves. Parabola $x = -y^2$, and line $y = x + 2$.
16.	Write the formula of length (arc length) for curve x=f(y).
17.	Sketch the region bounded by the given lines and curves. Parabola $y = 4x – x^2$, and line $y = 2$.

18.	What is the Fubini's theorem (First form) to find volume of a solid.
19.	Write the formula to find mass using triple integrals.
20.	Sketch the region bounded by the given lines and curves. Parabola $y^2 = 4 - x$, and line $y^2 = x$.
[B]	**3 – Marks Questions**
1.	Find the area of surface generated by revolving curve about y – axis, $x = y^3/3$ $0 \le y \le 1$
2.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = 2x$ and $x = 3$.
3.	Find the area of surface generated by revolving curve about x – axis, $y^2 = 4 + x$, $-4 \le x \le 2$
4.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = x^2$ and $y = x + 2$.
5.	Find the area of surface generated by revolving curve about x – axis, $y = \sqrt{2x - x^2}$, $0.5 \le x \le 1.5$
6.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = 3 - 2x$, $y = x$ and $x = 0$.
7.	Find the area of surface generated by revolving curve about x – axis, $y = \sqrt{x}$, $3/4 \le x \le 15/4$
8.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = 0$, $x = 0$, $y = 1$ and $y = \ln x$.
9.	Find the area of surface generated by revolving curve about x – axis, $y = x^3/9$, $0 \le x \le 2$
10.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = e^{-x}$, $y = 1$ and $x = \ln 3$.
11.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = nx$, $x=0$ and $y = 1$.
12.	Change the Cartesian integral into equivalent polar integral and evaluate the polar integral. $\int_{-1}^{1}\int_{0}^{\sqrt{1-x^2}} dy\, dx$
13.	Find the length of arc $x= (y^{3/2}/3) - y^{1/2}$ from y=1 to y=9.
14.	Write the iterated integral over the described region R using (1) vertical cross – section (2) Horizontal cross-section. Bounded by $y = \sqrt{x}$, y=0 and x =9.
15.	Find the length of arc $x= (y^3/3) + 1/(4y)$, from y=1 to y=3.
16.	Evaluate the iterated integral: $\int_{-1}^{0}\int_{-1}^{1} x + y + 1 \ \ dx\, dy$
17.	Find the length of arc $y = x^{3/2}$, from x =0 to x = 4.
18.	Evaluate the iterated integral: $\int_{0}^{1}\int_{1}^{2} x(x + y)\ dy\, dx$
19.	Find the length of arc $y = (1/3)(x^2+2)^{3/2}$, from x =0 to x = 3.
20.	Evaluate the iterated integral: $\int_{1}^{2}\int_{0}^{4} 2xy\ dy\, dx$
[C]	**5 – Marks Questions**
1.	Find the volume of the region bounded above by the parabolic $z = x^2 + y^2$ and below by the square R: $-1 \le x \le 1, -1 \le y \le 1$.
2.	Find the volume of the region bounded above by the paraboloid $z = x^2 + y^2$ and below by the triangle enclosed by the lines $y = x$, $x = 0$, and $x + y = 2$ in xy-plane.
3.	Evaluate the integrals. $\int_{0}^{1}\int_{0}^{1}\int_{0}^{1}(x^2 + y^2 + z^2)\ dz\, dy\, dx$
4.	Find the volume of the region bounded above by the parabolic $z = 16 - x^2 + y^2$ and

	below by the square R:$0 \le x \le 2, 0 \le y \le 2$.
5.	Evaluate the integrals. $\int_{-1}^{1}\int_{0}^{1}\int_{0}^{2}(x+y+z)\ dz\,dy\,dx$
6.	Find the center of mass of thin plate of density $\delta = 3$ bounded by the lines x = 0, y = x, and the parabola y = 2 – x^2 in the first quadrant.
7.	Find the volume of the region bounded above by the parabolic z = 2 –x - y and below by the square R:$0 \le x \le 1, 0 \le y \le 1$.
8.	Evaluate the integrals. $\int_{0}^{ln2}\int_{0}^{x}\int_{0}^{x+y} e^{x+y+z}\ dz\,dy\,dx$
9.	Find the centroid of region in the first quadrant bounded by the x-axis, the parabola y^2 = 2x, and the line x + y = 4.
10.	Find the volume of the region bounded above by the parabolic z = y/2 and below by the rectangle R: $0 \le x \le 4, 0 \le y \le 2$.
11.	Find the volume of the region bounded above by the cylinder z = x^2 and below by the triangle enclosed by the parabola y = 2 – x^2, and line y =x in xy-plane.
12.	Find the centroid of the triangular region cut from the first quadrant by the line x + y = 3.
13.	Find the volume of the region bounded above by the parabolic z = 2 sinxcosy and below by the rectangle R:$0 \le x \le \pi/2, 0 \le y \le \pi/4$.
14.	Evaluate the integrals. $\int_{0}^{\pi/6}\int_{0}^{1}\int_{-2}^{3} y\ sinz\ \ dx\,dy\,dz$
15.	Find the centroid of region cut from the first quadrant by the circle $x^2 + y^2 = a^2$.
16.	Find the volume of the region bounded above by the parabolic z = 4 – y^2 and below by the rectangle R:$0 \le x \le 1, 0 \le y \le 2$.
17.	Find the volume of the regions between the plane x + y + 2z = 2 and 2x + 2y + z = 4 in the first octant.
18.	Find the centroid of the region between the x – axis and the arch y = sinx, $0 \le x \le \pi$.
19.	Find the volume of the region bounded above by the parabolic z = 6 y^2 -2x and below by the rectangle R:$0 \le x \le 1, 0 \le y \le 2$.
20.	Find the volume of the solid whose base is the region in xy-plane that is bounded by the parabola y = 4 – x^2 and the line y = 3x, while the top of solid is bounded by the plane z = x + 4.
21.	Find the mass of the thin plate occupying the smaller region cut from the ellipse x^2 + 4y^2 = 12 by the parabola x = 4y^2 if $\delta(x,y)$ = 5x.
22.	Find the volume of the region bounded above by the parabolic z = $x^2 + y^2$ and below by the rectangle R:$1 \le x \le 2, 0 \le y \le 1$.
23.	Find the volume of the finite region bounded by the planes z = x, x + z = 8, z = y, y = 8 and z = 0.
24.	Find center of mass of thin triangular plate bounded by the y-axis and the lines y = x and y = 2 – x if $\delta(x,y)$ = 6x + 3y + 3.
25.	Find the volume of the region bounded above by the parabolic z = y sin(x+y) and below by the rectangle R:$-\pi \le x \le 0, 0 \le y \le \pi$.
26.	Find the volume of the portion of the cylinder $x^2 + y^2$ = 1 intercepted between the plane z = 0 and the paraboloid $x^2 + y^2$ = 4 – z.
27.	Evaluate the integrals. $\int_{0}^{1}\int_{0}^{2-x}\int_{0}^{2-x-y}\ dz\,dy\,dx$
28.	Find the volume of the region bounded above by the parabolic z = 1/$(x+y)^2$ and below by the rectangle R:$1 \le x \le 2, 3 \le y \le 4$.
29.	Find the volume of the solid in the first octant bounded by the coordinate planes, the plane x = 3 and the parabolic cylinder z = 4 – y^2.

30.	Evaluate the integrals. $\int_0^1 \int_0^{1-x} \int_0^{4-x^2-y} x \; dz\, dy\, dx$