1. Find the area enclosed by the curves $y = \frac{4}{x^2 + 4}$, the x-axis, and the vertical lines $x = -2$ and $x = 2$.

a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) 2π d) π e) none of these

2. Find the area enclosed by the curves of $y = \frac{2}{x}$ and $x + y = 3$.

a) $\frac{1}{2} - 2\ln(2)$ b) $\frac{3}{2}$ c) $\frac{1}{2} - \ln(4)$ d) $\frac{5}{2}$ e) $\frac{3}{2} - \ln(4)$

3. The area enclosed by the ellipse with parametric equations $x = 2\cos\theta$ and $y = 3\sin\theta$ equals

a) 6π b) $\frac{9}{2}\pi$ c) 3π d) $\frac{3}{2}\pi$ e) none of these

4. The area enclosed by one loop of the cycloid with parametric equations $x = \theta - \sin\theta$ and $y = 1 - \cos\theta$ equals

a) $\frac{3\pi}{2}$ b) 3π c) 2π d) 6π e) none of these

5. Suppose the following is a table of values for y = f(x), given that f is continuous on [1,5]:

x	1	2	3	4	5
y	1.62	4.15	7.50	9.00	12.13

If a trapezoidal sum is used, with n = 4, then the area under the curve from x = 1 to x = 5 is equal, to two decimal places, to…..

a) 6.88 b) 13.76 c) 20.30 d) 25.73 e) 27.53

6. The area A enclosed by the four-leaved rose $r = \cos(2\theta)$ equals, to three decimal places,

a) 0.785 b) 1.571 c) 2.071 d) 3.142 e) 6.283

7. The integral set-up for the volume formed when the region enclosed by the curves $y = x^2$ and $y = 4$ is revolved about the line $y = -1$ would be:

a) $4\pi\int_{-1}^{4}(y+1)\sqrt{y}\,dy$ b) $2\pi\int_{0}^{2}(4-x^2)^2\,dx$ c) $\pi\int_{-2}^{2}(16-x^4)dx$ d) $2\pi\int_{0}^{2}(24-2x^2-x^4)dx$

e) none of these

8. Find the volume of the solid formed by revolving an arch of $y = \sin(x)$ and the *x*-axis about the *x*-axis:

a) $\frac{\pi}{2}\left(\pi-\frac{1}{2}\right)$ b) $\frac{\pi^2}{2}$ c) $\frac{\pi^2}{4}$ d) π^2 e) $\pi(\pi-1)$

9. Find the volume of the solid formed by revolving the curves with parametric equations $x = \tan(\theta)$, $y = \cos^2(\theta)$, and the lines $x = 0$, $x = 1$, and $y = 0$ about the

x-axis.

a) $\pi\int_{0}^{\pi/4}\cos^4(\theta)d\theta$ b) $\pi\int_{0}^{\pi/4}\cos^2(\theta)\sin(\theta)d\theta$ c) $\pi\int_{0}^{\pi/4}\cos^2(\theta)d\theta$

d) $\pi\int_{0}^{1}\cos^2(\theta)d\theta$ e) $\pi\int_{0}^{1}\cos^4(\theta)d\theta$

10. The base of a solid is the region bounded by the parabola $x^2 = 8y$ and the line $y = 4$, and each plane section perpendicular to the y-axis is an equilateral triangle. The volume of the solid is

a) $\frac{64\sqrt{3}}{3}$ b) $64\sqrt{3}$ c) $32\sqrt{3}$ d) 32 e) none of these

11. The length of the arc of the curve $y^2 = x^3$ cut off by the line $x = 4$ is

a) $\frac{4}{3}(10\sqrt{10}-1)$ b) $\frac{8}{27}\left(10^{3/2}-1\right)$ c) $\frac{16}{27}\left(10^{3/2}-1\right)$ d) $\frac{16}{27}\left(10\sqrt{10}\right)$

e) none of these

12. The length of one arch of the cycloid $\begin{cases} x = t-\sin(t) \\ y = 1-\cos(t) \end{cases}$ equals

a) $\int_{0}^{\pi}\sqrt{1-\cos(t)}dt$ b) $\int_{0}^{2\pi}\sqrt{\frac{1-\cos(t)}{2}}dt$ c) $\int_{0}^{\pi}\sqrt{2-2\cos(t)}dt$ d) $\int_{0}^{2\pi}\sqrt{2-2\cos(t)}dt$

e) $2\int_{0}^{\pi}\sqrt{\frac{1-\cos(t)}{2}}dt$

13. Which of the following is an improper integral?

a) $\int_0^2 \frac{dx}{\sqrt{x+1}}$ b) $\int_{-1}^1 \frac{dx}{1+x^2}$ c) $\int_0^2 \frac{xdx}{1-x^2}$ d) $\int_0^{\pi/3} \frac{\sin(x)dx}{\cos^2(x)}$

e) none of these

14. Find the area in the first quadrant under the curve of $y = e^{-x}$.

a) 1 b) e c) $1/e$ d) 2 e) none of these

15. Find the area between the curve $y = \frac{4}{\sqrt{1-x^2}}$ and its asymptotes.

a) $\frac{\pi}{2}$ b) π c) 2π d) 4π e) none of these

16. Find the volume of the solid formed by $y = \frac{1}{x}$, at the left by $x = 1,$ and below by $y = 0$, revolved about the x-axis.

a) $\frac{\pi}{2}$ b) π c) 2π d) 4π e) none of these

17. $\int_1^2 \frac{dt}{\sqrt[3]{t-1}} =$

a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) 3 d) 1 e) none of these