Chapter 10 Review

F04 (n) The area between the x-axis and the parametric curve $x = t + t^2,\ y = t - t^2,\ 0 \le t \le 1$ is given by $\int y\,dx$ and has value _____

F06 (d) $\dfrac{x^2}{4} - \dfrac{y^2}{25} = 1$ is the equation of a/an _____

F07 (b) Find the vertex of the graph of $y = x^2 + 4x$. _____

(c) The equation $2x^2 + 3x + y^2 - y = 7$ is called a _____.

(d) If $r = f(\theta), \theta \in [a, b]$ is an equation of a curve in polar coordinates, give the formula for the area enclosed by this curve. _____

F04 7. Write the equation $r = 2\cos\theta - \sin\theta$ in rectangular coordinates and simplify your answer.

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

(b) $x^2 + y^2 = 2xy^2 - y$

(c) $x^2 + 2y^2 = x - 2y$

(d) $2x^2 + y^2 = 2x + y$

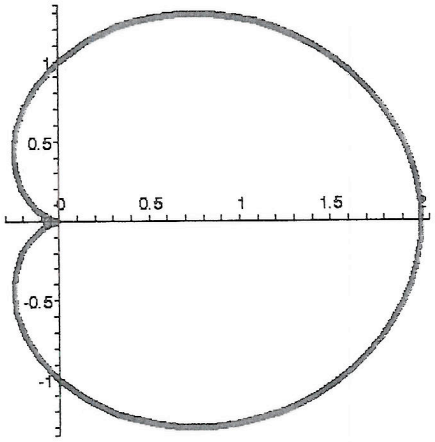
(e) $(x + y)^2 = 2x - y$

(f) None of the above

(i)

(j)

8. Identify the equation which goes with the polar graph,



(a) $r = 2\cos\theta,\ \theta \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(b) $r = 3 + \sin(5\theta),\ \theta \in [0, 2\pi]$

(c) $r = 1 + \cos\theta, \theta \in [0, 2\pi]$

(d) $r = \frac{4}{\quad}\ \theta \in [0, 2\pi]$

(e) $r = 1 + \sin\theta,\ \theta \in [0, 2\pi]$

(f) $r = \sin(3\theta),\ \theta \in \left[0, \frac{\pi}{3}\right]$

(g) $r = 1 + \cos(2\theta),\ \theta \in [0, 2\pi]$

(h) None of the above

F05 7. The area enclosed by the polar curve $r = 3 + \sin\theta$ is

(a) 5π (e) 4.5π

(b) 4π (f) 19π

(c) 9π (g) $9\pi^2$

(d) $\pi/4$ (h) None of these

F06 8. The graph of the polar equation $r = 2\cos(n\theta)$ has how many petals?

(a) n petals if n is even, $2n$ petals if n is odd (e) n petals

(b) $n/2$ petals if n is odd, n petals if n is even (f) $n/2$ petals

(c) n petals if n is odd, $2n$ petals if n is even (g) None of these

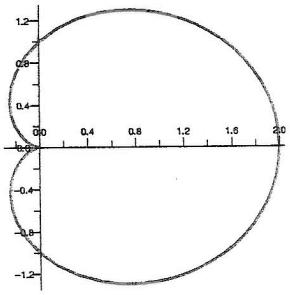
(d) $2n$ petals

F07 2. Find the area enclosed by the polar curve $r = 2 + \sin\theta$ for $\theta \in [0, 2\pi]$.

a) $\frac{5}{2}\pi$ b) $\frac{11}{3}\pi$ c) 2π

d) 4π e) $\frac{9}{2}\pi$ f) None of the above.

3. Identify the equation which goes with the polar graph,



a) $r = 1 + 2\cos\theta$ b) $r = 1 + \cos\theta$ c) $r = 2 + \sin\theta$

d) $r = 2\sin(2\theta)$ e) $r = 2\cos(2\theta)$ f) None of the above.

F04 17. Consider the ellipse $x^2 + 4y^2 = 1$.

(a) Give the foci of the ellipse.

(b) Find the area of the ellipse.

(c) Write the equation of an ellipse in polar form .

(d) Write down (but do not evaluate) the integral that represents the perimeter of the above ellipse in the parametric form $x = t, y = y(t)$, $-1 \le t \le 1$.

f05 (18.) Given the polar curve $r = \theta^2,\ 0 \leq \theta \leq 3/2$,

(a) sketch the curve;

(b) find the area swept out by the curve;

(c) find the arc length.

—End—

W06 23. (a) Sketch the graph of $r = e^{\theta/2}$.

(b) Find the area inside the curve $r = e^{\theta/2}$ and outside the circle $r = 1$ for $0 \leq \theta \leq \pi$.

(c) Find the slope of the polar curve $r = e^{\theta/2}$ at the point $[1, 0]$.

24. The position, in feet, of a slow pitch softball at time t, in seconds, is given by the parametric equations

$$\begin{cases} x = 18\sqrt{3}\, t \\ y = -16t^2 + 18t + 4 \end{cases}$$

(a) What is the rate of change of the height of the ball with respect to its horizontal position when it crosses the plate at $t = 1.2$ seconds?

(b) Set up but do not evaluate an integral giving the arc length of the path of the ball for $0 \leq t \leq 1.2$.

F06 13. Find the area enclosed by the polar curves $r = 2 - \cos\theta$ and $r = 1$.

F07 17. (6 points) Here is a parameterized curve called a cycloid. find the equation of the tangent line when $\theta = \pi/3$.

$$x(\theta) = \theta - \sin\theta$$
$$y(\theta) = 1 - \cos(\theta)$$