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| 3/17    | Parametric Equations        | 11.1     | J1: Read section 11.1  
Do: pp. 547 - 548 #1 - 5 (choose 2 odd); #7 - 15 (choose 2 odd); #17 - 21 (choose 2 odd); #23 and 25; #27 - 33 (choose 2 odd) (10) |
| 3/19    | Vector-Valued Functions     | 11.2     | J2: Read section 11.2  
Do: pp. 558 - 559 #1 - 31 (choose 1 odd per set of directions); #37, 41, 43, 47, 49 (11) |
| 3/23    | Polar Functions             | 11.3     | J3: Read section 11.3  
Do: p. 571 - 572 #1 - 9 (choose 1 odd per set of directions); #11 - 37 (choose 2 odd per set of directions); #39 or 41 (10)  
* graphs on polar grids*  
J4:  
p. 572 - 573 #43 - 59 odd (9) |
| 3/25    |                             |          |  
| 3/27    | Quiz 9B                     | 11.3     | J5: Do: pp. 548 - 549 #45 - 49 odd; p. 559 #53 - 57 odd  
pp. 572 - 573 #61 - 65 odd; p. 574 Quick Quiz #1 - 3 all (12) |
J7: Quiz 9B corrections on a separate sheet of looseleaf.  
J8: Review for test: pp. 575 - 576 #1 - 49 every other odd (13)  |
| 4/2     | TEST 9                      | 11.1 - 11.3 | Deadline for Set J Assignments |
1. Find \( \frac{dy}{dx} \) and \( \frac{d^2y}{dx^2} \) for the function \( x = t^2 + t \) \( y = t^2 - t \) in terms of \( t \).

\[
\frac{dy}{dx} =
\]

\[
\frac{d^2y}{dx^2} =
\]

2. Find the points at which the tangent to the curve is horizontal and vertical.

\[
x = -2 + 3\cos t \quad y = 1 + 3\sin t
\]

Horizontal:

Vertical:

3. Find the length of the curve \( x = \frac{(2t + 3)^{3/2}}{3} \) \( y = \frac{t^2}{2} + t \) \( 0 \leq t \leq 3 \).

4. A particle travels from \( t = 0 \) to \( t = 4 \) along the curve parametrized by \( x = \frac{t^2}{2} \) \( y = \frac{1}{3}(2t + 1)^{3/2} \).

At what point \((x, y)\) has the particle covered half of the length of the curve?
5. Given: \( \vec{r}(t) = (t^2 - 3)i + \left( \frac{t}{3} \right)j \) for \(-2 \leq t \leq 2\), a position vector of a particle in the plane.
   a) Draw a graph of the path of the particle.

b) Find the velocity vector of the particle.

c) Find the acceleration vector of the particle.

d) Find the speed of the particle at \( t = 2/3 \)

e) Find the direction of motion at \( t = 2/3 \)

6. The vector \( \vec{r}(t) = (2t^3 - 3t^2)i + (t^3 - 12t)j \) gives the position of a moving particle at time \( t \).
   a) Write the equation of the line tangent to the path of the particle at the point where \( t = -1 \).

b) Find the coordinates of each point on the path where the horizontal component of the velocity is 0.

7. Solve the initial value problem for \( r \) as a function of \( t \).
   \[ \frac{d\vec{r}}{dt} = (\cos t)i + (4t^3 + 5)j \]
   \( \vec{r}(0) = -5j \)

8. Evaluate the integral \( \int_{-\pi/4}^{\pi/4} [(\sin t)i + (1 + \cos t)j] dt \)
A calculator is NOT allowed on this part of the quiz.

Which of the following represents the graph of the polar curve $r = 2 \sec \theta$?

(A) ![Graph A]

(B) ![Graph B]

(C) ![Graph C]

(D) ![Graph D]

(E) ![Graph E]

2. The area of the region inside the polar curve $r = 4 \sin \theta$ and outside the polar curve $r = 2$ is given by

(A) $\frac{1}{2} \int_0^\pi (4 \sin \theta - 2)^2 \, d\theta$

(B) $\frac{1}{2} \int_0^{\frac{3\pi}{4}} (4 \sin \theta - 2)^2 \, d\theta$

(C) $\frac{1}{2} \int_\pi^{\frac{5\pi}{6}} (4 \sin \theta - 2)^2 \, d\theta$

(D) $\frac{1}{2} \int_\frac{\pi}{6}^{\frac{5\pi}{6}} (16 \sin^2 \theta - 4) \, d\theta$

(E) $\frac{1}{2} \int_0^\pi (16 \sin^2 \theta - 4) \, d\theta$
3. Which of the following is equal to the area of the region inside the polar curve $r = 2 \cos \theta$ and outside the polar curve $r = \cos \theta$?

(A) $3 \int_0^{\pi/2} \cos^2 \theta \, d\theta$  
(B) $3 \int_0^{\pi} \cos^2 \theta \, d\theta$  
(C) $\frac{3}{2} \int_0^{\pi/2} \cos^2 \theta \, d\theta$  
(D) $3 \int_0^{\pi} \cos \theta \, d\theta$  
(E) $3 \int_0^{\pi} \cos \theta \, d\theta$

4. If the function $r = f(\theta)$ is continuous and nonnegative for $0 \leq \alpha \leq \theta \leq \beta \leq 2\pi$, then the area enclosed by the polar curve $r = f(\theta)$ and the lines $\theta = \alpha$ and $\theta = \beta$ is given by

(A) $\frac{1}{2} \int_{\alpha}^{\beta} f(\theta^2) \, d\theta$  
(B) $\frac{1}{2} \int_{\alpha}^{\beta} f(\theta) \, d\theta$  
(C) $\frac{1}{2} \int_{\alpha}^{\beta} \theta f(\theta^2) \, d\theta$  
(D) $\frac{1}{2} \int_{\alpha}^{\beta} \theta f(\theta) \, d\theta$  
(E) $\frac{1}{2} \int_{\alpha}^{\beta} [f(\theta)]^2 \, d\theta$

5. Which of the following integrals gives the total area of the region inside both polar curves $r = 2 \cos \theta$ and $r = 2 \sin \theta$?

(A) $2 \int_0^{\pi/4} \sin^2 \theta \, d\theta$  
(B) $2 \int_0^{\pi/4} (\cos^2 \theta - \sin^2 \theta) \, d\theta$  
(C) $2 \int_0^{\pi/4} \sin^2 \theta \, d\theta$  
(D) $4 \int_0^{\pi/4} \cos^2 \theta \, d\theta$  
(E) $4 \int_0^{\pi/4} \sin^2 \theta \, d\theta$
6. The area enclosed by the polar curve \( r = 6\cos\theta + 8\sin\theta \) from \( \theta = 0 \) to \( \theta = \pi \) is

(A) \( 9\pi \)

(B) \( 16\pi \)

(C) \( 25\pi \)

(D) \( 36\pi \)

(E) \( 64\pi \)

7. The graph of \( r_3 = \sin(3\theta) \) is a rose curve with three “petals.” The graph of \( r_5 = \sin(5\theta) \) is a rose curve with five “petals.” Which of the following statements about \( r_3 \) and \( r_5 \) are true?

I. The area enclosed by one “petal” of \( r_3 \) is larger than the area enclosed by one “petal” of \( r_5 \).

II. The total area enclosed by the three “petals” of \( r_3 \) is less than the total area enclosed by the five “petals” of \( r_5 \).

III. The total area enclosed by the three “petals” of \( r_3 \) is greater than the total area enclosed by the five “petals” of \( r_5 \).

(A) I only

(B) II only

(C) III only

(D) I and II

(E) I and III
8. The area of the region enclosed by the polar curve \( r = 2(\sin \theta + \cos \theta) \) is

(A) 1
(B) 2
(C) \( \pi \)
(D) 2\( \pi \)
(E) 4\( \pi \)

9. Which of the following gives the area of the region enclosed by the graph of the polar curve \( r = 1 + \cos \theta \)?

(A) \( \int_{0}^{\pi} (1 + \cos^2 \theta) \, d\theta \)
(B) \( \int_{0}^{\pi} (1 + \cos \theta)^2 \, d\theta \)
(C) \( \int_{0}^{2\pi} (1 + \cos \theta) \, d\theta \)
(D) \( \int_{0}^{2\pi} (1 + \cos \theta)^2 \, d\theta \)
(E) \( \frac{1}{2} \int_{0}^{2\pi} (1 + \cos^2 \theta) \, d\theta \)