

Math 3330 - Test 1

Name: _____

No calculators and show all work.

1. Find a parametric equation for the following:

(a) The line: $2x + 3y = 7$.

(b) The circle: $x^2 + y^2 = 12$.

(c) The line segment from point $P(1, 3)$ to the point $Q(-3, 4)$. For this problem include a range for t .

2. Define the function parametrically: $x = 2 \cos(2t)$ and $y = 3 \sin(3t)$.
Find the equation of the tangent line at $t = \pi/4$.

3. Find the arclength from $t = 0$ to $t = 3$ for the function given parametrically as:
 $x = \cos(3t^2)$ and $y = \sin(3t^2)$

4. Graph the functions $r = 2$ and $r = 4 \cos(\theta)$ and shade the intersection area.

5. Find the area inside $r = \sqrt{2 + \cos(\theta)}$.

6. Graph the function $z = y^2$ in \mathbb{R}^2 and in \mathbb{R}^3 .

7. Prove $\|\mathbf{v} + \mathbf{w}\|^2 + \|\mathbf{v} - \mathbf{w}\|^2 = 2\|\mathbf{v}\|^2 + 2\|\mathbf{w}\|^2$.

8. Let $\mathbf{v}_1 = \langle 1, 1, 2 \rangle$ and $\mathbf{v}_2 = \langle 1, -3, 7 \rangle$.
- (a) Find the angle between \mathbf{v}_1 and \mathbf{v}_2 .
 - (b) the vectors \mathbf{v}_1 and \mathbf{v}_2 form a parallelogram. Find its area.
 - (c) Find a single unit vector \mathbf{w} that is simultaneously perpendicular to \mathbf{v}_1 and \mathbf{v}_2 .