Exam Review

1. Convert polar $\left(\sqrt{3}, \frac{\pi}{6}\right)$ to rectangular

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Answer: $\left(\frac{3}{2}, \frac{\sqrt{3}}{2}\right)$

2. Find area inside one petal of $r = 3\cos(3\theta)$

Answer: 2.356

3.
Area inside $r = 3\sin\theta$ but outside $r = 2 - \sin\theta$

Answer: 5.196

4. $\vec{v} = \cos(2t)\vec{i} - 2\sin t\,\vec{j}$

When t = 0, the particle is at $\langle 3, -2 \rangle$.

Find the position vector.

Answer: $\vec{r} = (\frac{1}{2}\sin(2t) + 3)\vec{i} + (2\cos t - 4)\vec{j}$

5. Given $x = \sqrt{t}$ and $y = \frac{1}{4}(t^2 - 4)$

A. Find the equation of the tangent line when t = 4

B. Find $\frac{d^2y}{dx^2}$

C. What is the concavity at t = 4?

D. Find the arc length of the curve 1<t<5

A. y – 3 = 8(x – 2)

B. 3t

C. Concave up

D. 6.1876

6. Given $y = \sqrt{x}$, find the arc length 0<x<3

Answer: 3.6114

7. Find equation of tangent line to $r = \cos(3\theta)\ at\ \theta = \pi/6$

Answer: $y = \frac{\sqrt{3}}{3}x$

8. Use Euler's method to approximate $y(0.2)$ of $y'=y$ with $y(0) = 1$ using 2 steps.

Answer: 1.210

9. Solve $e^{3y}\frac{dy}{dx} = x^2$

Answer: $y = \frac{1}{3}\ln(x^3 + D)$

10. What is the carrying capacity and when will the population be increasing the fastest?

A. $\frac{dP}{dt} = .36P\left(1 - \frac{P}{26}\right)$

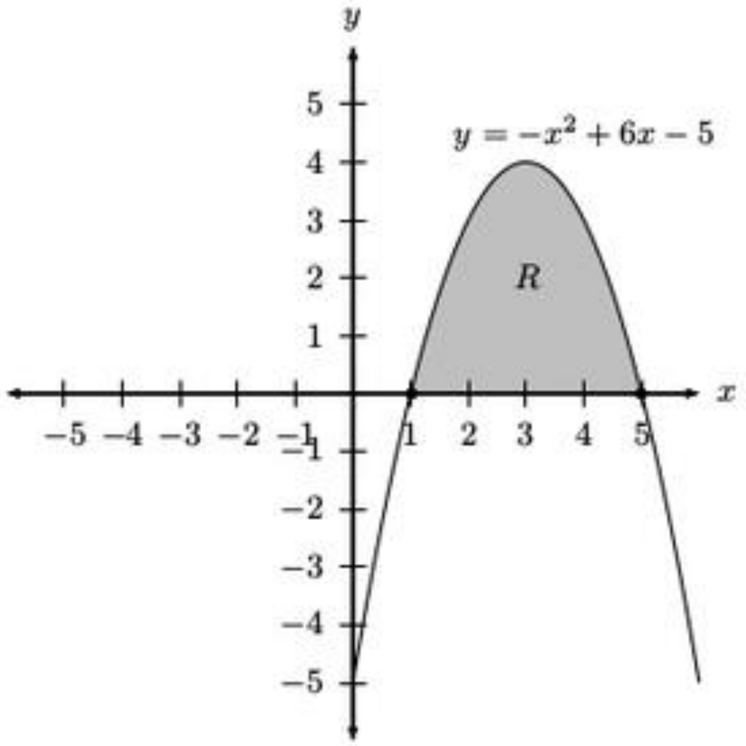
B. $\frac{dP}{dt} = \frac{2}{2500}P(50 - P)$

Answers: A. Carrying capacity = 26, increasing the fastest when population is 13

- B. Carrying capacity = 50, increasing the fastest when population is 25

11. Use the shell method to find the volume of the region bound by $y = -x^2 + 6x - 5$ and the x-axis.

Answer: $\int_1^5 2\pi x(-x^2 + 6x - 5)dx = 64\pi = 201.062$



12. The number of cells are growing exponentially. If there are initially 500 cells and they double in 25 minutes, how many cells are there in 45 minutes?

Answer: $k = \ln 2/25$, 1741 cells