

Quiz 6 Outline

Format. This quiz has **3 multiple-choice** questions and **1 free-response** question.

1. (2 points) Compute the center of mass of a region (using the formulas).

Example: Consider the region R bounded by the curves $y = \sin x$, $y = 0$ with $0 \leq x \leq \pi$. What is the centroid of the region R ?

- A. $(\pi/2, \pi/4)$
- B. $(\pi/2, \pi/8)$
- C. $(\pi, \pi/8)$
- D. $(\pi, \pi/4)$

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2. (2 points) Choose the correct parametric equation.

Example: Which of the following is a *parametric equation* which describes a circle of radius 2, centered at $(3, 0)$, traversed clockwise.

- A. $x = \cos(-2t)$, $y = \sin(-2t + 3)$, $0 \leq t \leq 2\pi$
- B. $x = \cos(2t + 3)$, $y = 2 \sin(2t)$, $0 \leq t \leq 2\pi$
- C. $x = 2 \cos(-t) + 3$, $y = 2 \sin(-t)$, $0 \leq t \leq 2\pi$
- D. $x = 2 \cos(t) + 3$, $y = 2 \sin(t)$, $0 \leq t \leq 2\pi$
- E. $y = \sqrt{4 - (x - 3)^2 - y^2}$

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3. (2 points) Compute the slope of the tangent line of a parametric curve, or compute the equation of the tangent line at a point.

Example: Consider the curve given by the parametric equations $x = 2 \sin t$, $y = \cos t$ with $0 \leq t < 2\pi$. What is the slope of the line tangent to this curve at the point

$$\left(2 \sin\left(\frac{\pi}{4}\right), \cos\left(\frac{\pi}{4}\right)\right) = \left(\sqrt{2}, \frac{\sqrt{2}}{2}\right)?$$

- A. 2
- B. $-\frac{1}{2}$
- C. $\frac{1}{2}$
- D. $\sqrt{2}$
- E. $\frac{\sqrt{2}}{2}$

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4. (4 points) Arc length of a parametric curve.

Example Find the length of the curve given by the parametric equations

$$x = 3 + t^2, \quad y = 1 - 2t^3, \quad 0 \leq t \leq 1$$

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Solutions

All problems listed come from previous midterms; complete solution keys are posted on Canvas.