

Due at the beginning of class on the day of the Final Exam

Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2414, and the title of the worksheet. Show all work to justify your answer. Answer with insufficient work will receive no credit.

Problem 1: Sketch a curve described by parametric equations

Sketch the curve describe by the parametric equations, indicate the direction in which the curve is traced as the parameter increases and find the rectangular equation by eliminating the parameter.

1. $x = 2t - 3, y = 3t + 1$

2. $x = t + 1, y = t^2$

3. $x = 8 \cos \theta, y = 8 \sin \theta, 0 \leq \theta \leq 2\pi$

Problem 2: Eliminate the parameter

Eliminate the parameter to find the rectangular equation for the curve. Identify the curve.

1. $x = 4 + 2 \cos \theta, y = -1 + \sin \theta$

2. $x = 4 \sec \theta, y = 3 \tan \theta$

3. $x = e^{2t}, y = e^t$

Problem 3: Find a derivative

Find $\frac{dy}{dx}$ for the curve given by the parametric equations

1. $x = t^2, y = 7 - 6t$

2. $x = \sin^2 \theta, y = \cos^2 \theta$

Problem 4: Find slope and concavity

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ and find the slope and concavity of the curve at the given point.

1. $x = t + 1, y = t^2 + 3t, t = -1$

2. $x = \cos^3 \theta, y = \sin^3 \theta, \theta = \frac{\pi}{4}$

Problem 5: Horizontal and Vertical Tangent Lines

Find all points at which the tangent line to the parametric curve is horizontal or vertical.

1. $x = t^2 - t + 2, y = t^3 - 3t$

2. $x = \cos \theta, y = 2 \sin(2\theta)$

Problem 6: Find arc length

Find the arc length of the curve on the given interval

1. $x = 6t^2, y = 2t^3, 1 \leq t \leq 4$

2. $x = e^{-t} \cos t, y = e^{-t} \sin t, 0 \leq t \leq \frac{\pi}{2}$

Problem 7: Find surface area

Find the area of the surface generated by revolving the curve about the given axis.

1. $x = 2t, y = 3t, 0 \leq t \leq 3$ about x -axis and y -axis

2. $x = 5 \cos \theta, y = 5 \sin \theta, 0 \leq \theta \leq \frac{\pi}{2}$ about the y -axis