

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES
MATH 201
Exam # 1
Oct 2, 2005

NAME:	Sec#:	ID#:
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SHOW ALL YOUR WORK

1. **(5points)** Give the missing values:

(a) $(-2, -\frac{\pi}{2})$ in polar coordinates = (,) in rectangular coordinates.

(b) $(2, \frac{3\pi}{4})$ in polar coordinates = $(-2, \quad)$ in polar coordinates.

(c) $(-1, \frac{\pi}{3})$ in polar coordinates = (, $-\frac{5\pi}{3}$) in polar coordinates.

(d) $(3, \frac{7\pi}{6})$ in polar coordinates = (, $\frac{\pi}{6}$) in polar coordinates.

(e) $(2, -2)$ in rectangular coordinates = (, $\frac{3\pi}{4}$) in polar coordinates.

2. **(5 points)** Find all points of intersection between the cardioid $r = 1 + \cos \theta$ and the circle $(x - \frac{3}{2})^2 + y^2 = \frac{9}{4}$, (a) in polar coordinates, and (b) in rectangular coordinates.

3. **(5 points)** A parametric curve is said to cross itself if it passes through the same point (x, y) for two distinct values of the parameter t . Show that the curve $x = t^3 - 4t$, $y = t^2$ crosses itself at the point $(0, 4)$ and find the equations of the two tangent lines at that point.

4. **(5 points)** Calculate the arc length of the polar curve $r = \sin^3 \frac{\theta}{3}$ from $\theta = 0$ to $\theta = \frac{\pi}{2}$.

5. **(5points)** Set up an integral to compute the area inside the rose $r = \sin 2\theta$.

6. (a) **(5points)** Set up an integral to compute the area inside the cardioid $r = 1 + \cos \theta$ but outside the circle $r = \frac{3}{2}$.