
Midterm Test, MAST 218, Fall 2013

All problems have equal value. Each is worth 6 marks.

Show all your steps. Write the solutions in the examination booklet only.

Problem 1: The curve is given parametrically:

$$x(t) = e^{3t} \cos(3t) \quad , \quad y(t) = e^{3t} \sin(3t) \quad , \quad t \in [0, \pi/3] .$$

- (1). Find the length L of the curve.
- (2). At which points the tangent to the curve is vertical?

Problem 2: For the curve given by:

$$r(\theta) = 2 + 2 \cos \theta \quad , \quad 0 \leq \theta \leq 2\pi \quad ,$$

- (1). Give a rough sketch of the curve.
- (2). Calculate the area enclosed by the curve.

Problem 3: For the curve:

$$r = \frac{6}{2 + 6 \sin \theta} .$$

- (1). Find the eccentricity and the directrix.
- (2). Sketch the curve.

Problem 4: Find the equation of the plane PL passing through three points:

$A = (1, 0, 1)$, $B = (-1, 2, 5)$ and $C = (5, 1, -1)$. Find the parametric equation of the line L passing through the origin and perpendicular to the plane PL .

Problem 5: Consider the function:

$$f(x) = \int_0^x \frac{dt}{2 - t^2}$$

Find the Taylor series about the origin for $f(x)$.

What is the radius of convergence of the series?

GOOD LUCK !!!