

# Midterm III

## Math 182, Section 1

### Sample Problems

#### Question 1

Eliminate the parameter to find a Cartesian equation for the curve given by the parametric equations

$$x = \ln t, y = \sqrt{t}$$

for  $t \geq 1$ . Sketch the curve and indicate the direction the curve is traversed as  $t$  increases.

#### Question 2

Find the equation of the tangent to the curve given by the parametric equations

$$x = 2t + 1, y = \frac{1}{3}t^3 - t$$

at the point where  $t = 3$ .

#### Question 3

Find the length of the curve

$$y = \frac{x^4}{4} + \frac{1}{8x^2}$$

where  $1 \leq x \leq 3$ .

#### Question 4

A cow is tied to a silo of radius  $r$  by a rope just long enough to reach the opposite side of the silo. Find the area available for grazing by the cow. (See p654, questions 41 and 42.)

#### Question 5

Graph the curve given by the parametric equations

$$x = e^t \cos t, y = e^t \sin t$$

over the interval  $0 \leq t \leq \pi$ , and find the length of the curve.

#### Question 6

Find the area of the surface obtained by rotating the curve

$$x = t^3, y = t^2$$

where  $0 \leq t \leq 1$  about the  $x$ -axis.

**Question 7**

Show that the polar curve  $r = 4 + 2 \sec \theta$  (called a *conchoid*) has the line  $x = 2$  as a vertical asymptote. Use this fact to help sketch the conchoid.

**Question 8**

Find the slope of the tangent line to  $r = \cos \theta + \sin \theta$  at  $\theta = \pi/4$ .

**Question 9**

Sketch the curve  $r = 3(1 + \cos \theta)$  and find the area it encloses.

**Question 10**

Find a Cartesian equation which has the same graph as the polar equation  $r \cos \theta = 1$ .

**Question 11**

Find the length of the polar curve  $r = 5 \cos \theta$  over the interval  $0 \leq \theta \leq 3\pi/4$ .

**Other Questions**

Try:

Chapter 10 review, pp 688–689, exercises 1–38.