

UNIVERSITY OF MANITOBA

MATH 1700 D01

Assignment 5

This assignment is based on units 9 and 10.

1.

(a) Sketch the curve  $x = 1 + 3t$ ,  $y = 2 - t^2$  by using the parametric equations to plot the points. Indicate with an arrow the direction in which the curve is traced as  $t$  increases.

(b) Eliminate the parameter to find a Cartesian equation of the curve.

2.

Let  $x = t^3 - 12t$ ,  $y = t^2 - 1$ .

(a) Find  $dy/dx$  and  $d^2y/dx^2$ .

(b) For which values of  $t$  is the curve concave upward ?

3.

Find the exact length of the curve  $x = e^t + e^{-t}$ ,  $y = 5 - 2t$ ,  $0 \leq t \leq 3$ .

4.

Find the exact area of the surface obtained by rotating the curve  $x = 3t - t^3$ ,  $y = 3t^2$ ,  $0 \leq t \leq 1$  about the  $x$ -axis.

5.

Sketch the curve with the polar equation  $r = -3 \cos \theta$ .

6.

Find the slope of the tangent line to the polar curve  $r = 2 - \sin \theta$ , at the point  $\theta = \pi/3$ .

7.

Find the area of the region that lies inside  $r = 3 \sin \theta$  and outside  $r = 2 - \sin \theta$ .

8.

Find the exact length of the polar curve  $r = e^{2\theta}$ , with  $0 \leq \theta \leq 2\pi$ .