UNIVERSITY OF MANITOBA

MATH 1700 D01

Assignment 5

This assignment is based on units 9 and 10. SHOW ALL WORK to get full marks. Leave answers as exact answers. For example, leave it as $1/7$ as opposed to 0.142857.

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 $x = e^t + e^{-t}$, $y = 5 - 2t$, $\quad 0 \leq t \leq 3$.

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 $0 \leq \theta \leq 2\pi$.