

UNIVERSITY OF MANITOBA

MATH 1700 D01

Assignment 5

Due date: March 13, 2016 (Before midnight)

Total marks: 100

All assignments must be submitted ONLINE, in ONE single pdf file following the procedure explained on UM Learn. If you have trouble submitting them the right way, please contact the DE technical support. Your assignment will not be graded if you fail to submit it ONLINE, in ONE single pdf file.

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) (7 points) Eliminate the parameter to find a Cartesian equation of the curve  $x = 4t^2 - 5$ ,  $y = 2t + 3$ .
- (b) (7 points) Sketch the curve and indicate with an arrow the direction in which the curve is traced as  $t$  increases.

2.

Let  $x = \sqrt[3]{t}$ ,  $y = \sqrt[3]{t} - t$ .

- (a) (8 points) Find the points on the curve at which the tangent is either horizontal or vertical.
- (b) (8 points) Find  $dy/dx$  and  $d^2y/dx^2$ .

3.(12 points)

Find the exact length of the curve  $x = \cos 2t$ ,  $y = \sin^2 t$ ,  $0 \leq t \leq \pi$ .

4.(12 points)

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

5.(10 points)

Sketch the **polar** curve with the polar equation  $r = -2 \sin \theta$ .

**6.**(12 points)

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

**7.**(12 points)

Find the area of the region that lies inside  $r = 4 \cos \theta$  and outside  $r = 2$ .

**8.**(12 points)

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