MATH 1700: Assignment 4

Due: 11:59 pm (Central time = time in Winnipeg), Monday, 10 April 2017

(*Late assignments will not be accepted*)

Your paper with solutions has to be submitted as **one** PDF file with all pages clearly readable and placed in the file in the correct order. (Your paper may not be read and/or marked if these conditions are not met.)

All your answers have to be justified. Unjustified answers will receive little or no credit.

Note: this assignment covers sections 7.8, 8.1, 8.2, 10.2 and 10.4 (partial).

1. Evaluate the improper integral given or show that it is divergent.
   (a) (5 points) $\displaystyle\int_{-\infty}^{1} \frac{x}{1+x^4}\,dx$
   (b) (5 points) $\displaystyle\int_{0}^{1} \frac{x^2}{\sqrt{1-x^2}}dx$
2. Determine whether the improper integral is convergent or divergent. (Hint: is there more than one reason why this integral is improper?)
   (a) (5 points) $\displaystyle\int_{0}^{\infty} \frac{1}{\sqrt{x}e^x}dx$
   (b) (5 points) $\displaystyle\int_{-\infty}^{-1} \frac{\sqrt{-x}}{x^2-1}dx$
3. Find the length of the curve.
   (a) (5 points) $y = x^2 - \dfrac{\ln x}{8}$ from $x = 1$ to $x = 2$
   (b) (5 points) $x = \cos t + t\sin t$, $y = \sin t - t\cos t$, $0 \le t \le 2\pi$
4. Find the length of the polar curve.
   (a) (5 points) $r = \theta^2$, $0 \le \theta \le \pi$
   (b) (5 points) $r = 2 + 2\cos\theta$ (Hint: $1 - \cos^2\theta = \sin^2\theta$)
5. (5 points) Find the area of the surface obtained by rotating the curve $y = \dfrac{x^3}{12} + \dfrac{1}{x}$, $1 \le x \le 4$, about the y-axis.
6. (5 points) Find the area of the surface obtained by rotating the curve $x = 3t^2$, $y = 2t^3$, $0 \le t \le 1$, about the x-axis.
7. (10 points) Find the area of the surface obtained by rotating the ellipse $x^2 + 4y^2 = 4$ about the x-axis.
8. (10 points) Find the area of the surface obtained by rotating the curve $x = t - \sin t$, $y = 1 - \cos t$, $0 \le t \le 2\pi$, about the x-axis.

Question:	1	2	3	4	5	6	7	8	Total
Points:	10	10	10	10	5	5	10	10	70
Score:									