MATH 1700: Assignment 2

Due: 11:59 pm (Central time = time in Winnipeg), Monday, 27 February 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/marked if this condition is not met.)

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

Note: this assignment covers sections 5.3,5.4, 5.5, 6.1, 10.2 (partial), 10.4, 6.2, 6.3.

1. Use the Fundamental Theorem of Calculus to find derivatives of the following functions:
   (a) (5 points) $f(x) = \displaystyle\int_{\tan x}^{3} \frac{2^u}{u^2}\, du$
   (b) (5 points) $g(x) = \displaystyle\int_{1+\sin x}^{x^4} \frac{\tan u}{u}\, du$
2. Evaluate the following definite integrals:
   (a) (5 points) $\displaystyle\int_0^{\pi/4} \sqrt{\tan x}\,(\sec x)^4\, dx$
   (b) (5 points) $\displaystyle\int_1^{\sqrt{e}} \frac{\sin(\pi \ln x)}{2x}\, dx$
3. Find the following indefinite integrals:
   (a) (5 points) $\displaystyle\int \frac{x^2}{\sqrt{1-x}}\, dx$
   (b) (5 points) $\displaystyle\int \cos x \cdot \sin^3(\sin x)\, dx$
4. Find the areas of the following regions:
   (a) (5 points) Region between $x = y^2 - 2y$ and $x = 6y - y^2$.
   (b) (5 points) Closed loop of the curve $y^2 = x^4(1-x)$ that lies to the right of the origin.
5. Suppose that the solid of revolution is obtained by rotating the region bounded by $y = x^2 - 2x$ and $y = 2x - x^2$ about the line $y = 2$.
   (a) (3 points) Use the disc or washer method to set up an integral for the volume of this solid.
   (b) (2 points) Find this volume.

   (Note: no credit will be given if you do not use the disc or washer method.)

6. Suppose that the solid of revolution is obtained by rotating the region bounded by $x = y^2$, $y = \sqrt{2 - x}$ and $y = 0$ about the line $y = 1$.

   (a) (3 points) Use the cylindrical shell method to set up an integral for the volume of this solid.

   (b) (2 points) Find this volume.

   (Note: no credit will be given if you do not use the cylindrical shell method.)

7. Suppose that the solid of revolution is obtained by rotating the region bounded by $y = x^2$, $y = -x^2$ and $x = -1$ about the line $x = -2$.

   (a) (3 points) Set up an integral for the volume of this solid (you can use any method).

   (b) (2 points) Find this volume.

8. (5 points) Sketch and find the area of the region bounded by the parametric curve $x = t^3 - 4t$, $y = t^2$ $(0 \leq t \leq 2)$ and the y-axis.

9. (5 points) Sketch and find the area of the region inside both polar curves $r = 1$ and $r = 2\cos\theta$.

10. (5 points) Sketch and find the area of the region inside $r = |1 - 2\cos\theta|$.

Question:	1	2	3	4	5	6	7	8	9	10	Total
Points:	10	10	10	10	5	5	5	5	5	5	70
Score:											