

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

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ASSIGNMENT 6

MATHEMATICS 1001

FALL 2019

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**Due: Friday, November 1st, 2019 at 4:00pm. SHOW ALL WORK.**

**Note:** You are encouraged to complete the WebAssign problem set “The Fundamental Theorem of Calculus I” and the “Worksheet on Area Between Curves” before you work on this assignment.

1. Use the Second Fundamental Theorem of Calculus to find  $f'(x)$ .

(a)  $f(x) = \int_4^{\tan^2(x)} e^{t^3} dt$

(b)  $f(x) = \int_{-x}^{\sqrt{x}} \cos(t^2) dt$

2. Consider the region between the line  $y = \frac{1}{2}x + 1$  and the semi-parabola  $y = \sqrt{x + 2}$ .

- (a) Sketch a graph of the region.  
(b) Find the area of the region by integrating with respect to  $x$ .  
(c) Find the area of the region by integrating with respect to  $y$ .

3. Find the area of the indicated region.

- (a) The region bounded by  $y = 4 - x^2$  and  $y = 2x^2 + x - 6$ .  
(b) The region bounded by  $y = |x|$  and  $y = x^2 - 6$ .  
(c) The region bounded by  $y = \sin(2x)$  and  $y = \cos(x)$  on the interval  $\left[0, \frac{\pi}{2}\right]$ . Hint: recall that  $\sin(2x) = 2 \sin(x) \cos(x)$ .  
(d) The region bounded by  $y = \frac{1}{x^2}$ ,  $y = 8x$  and the line  $y = 1$ .