MATH 152(45) **Midterm 1** OCTOBER 21, 2016
SUBHADIP CHOWDHURY

Please show **all** your work! Answers without supporting work will not be given credit. Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.
Please note that use of calculator is not allowed.

Full Name: _____

Question	Points	Score
1	12	
2	7	
3	10	
4	8	
5	8	
6	15	
Total:	60	

This exam has 6 questions, for a total of 60 points. The maximum possible point for each problem is given on the right side of the problem.

Do not open this answer script unless you are instructed to do so.

1. Let

$$f(x) = \frac{1}{\sqrt{\text{arcsec}(x)}}$$

(a) What are the domain and range of $\text{arcsec}(x)$? 4

(b) What is the domain of f? 3

(c) Evaluate $f\left(\sec\left(\frac{23\pi}{4}\right)\right)$. 5

2. Let $f : \mathbb{R} \to \mathbb{R}$ be defined as $f(x) = x^3 - x^2 + 3x + 1$.

   (a) Is f injective? 4

   (b) Is f surjective? 3

3. (a) State the Fundamental Theorem of Calculus. [3]

(b) Let f be everywhere continuous and suppose, [7]

$$f(x) = \int_1^x \frac{2x - tf'(t)}{x^3} dt$$

Find $f'(1)$.

4. Evaluate the following limit using Riemann sum and definite integral. 8

$$\lim_{n\to\infty} \sum_{i=0}^{n-1} \frac{2n^2}{(n+2i)^3}$$

5. Find the area of the region bounded on 4 sides by the following curves: 8

(i) $X-$axis,

(ii) $Y-$axis,

(iii) the straight line $x = y + 1$, and

(iv) the parabola $5y = x^2 + 1$.

6. Find the following integrals.

(a) 9

$$\int \frac{\sin^3 x}{\cos^2 x} dx$$

(b) 6

$$\int (x-1)\sqrt{x^2-2x+3}\, dx$$