The University of Western Ontario (Western University)

Calculus 1501B, Winter 2014
Homework assignment 1

Due on Tuesday Jan. 28, in class.

Each problem is worth 3 marks (15 marks total).

Problem 1. Use the ε-δ definition of limit to prove that

$$\lim_{x \to 3} x^2 = 9$$

Problem 2. Use the definition of derivative to show that $f(x) = 5x^2 + x$ is differentiable for all x.

Problem 3. Find $f'(x)$ for

$$f(x) = 2^x(x^2 + 1)^3 + \arcsin x - \frac{x}{\sin x}$$

Problem 4. Use Mean Value Theorem to prove:
there is no differentiable function $f(x)$ such that $f(1) = -16$, $f(5) = 0$, $f'(x) < 3$ for all x.

Problem 5. Evaluate

$$\int x \cos(3x)\ dx$$

and

$$\int_1^8 x \ln x\ dx$$