

**MATH 401 INTRODUCTION TO ANALYSIS-I,
FALL TERM 2009, PRACTICE EXAM 1**

Note that the first exam is on Wednesday 23rd September, at 1:25 in Room 207 Sackett.

1. (25 points) Differentiate with respect to x .

(i) $(2x^3 - 1) \sin x$

(ii) $\frac{7x-4}{\ln x}$

2. (25 points) The function f is defined by

$$f(x) = \frac{4}{x+1} - \frac{1}{x}.$$

Find the local maxima and minima of f , and sketch its graph.

3. (25 points) Let $\mathcal{A}, \mathcal{B}, \mathcal{C}$ be sets. Prove that $(\mathcal{A} \cap \mathcal{B}) \cup \mathcal{C} = (\mathcal{A} \cup \mathcal{C}) \cap (\mathcal{B} \cup \mathcal{C})$.

4. (25 points) Prove that if x and y are real numbers with $0 < x < y$, then $0 < x^3 < y^3$.