ASSIGNMENT 0 **Math 2000** FALL 2018

Due: Friday, September 14th, 2018 by 2:00pm. SHOW ALL WORK.

> **Note:** This assignment covers many of the topics from Math 1000 and Math 1001 which are important to Math 2000. If you have trouble with any part of this assignment, you're strongly encouraged to review the relevant topics early in the semester. Feel free to use the materials from those courses available on my website for extra practice. This assignment will carry the same weight as other assignments in the course.

1. <u>Without</u> using l'Hôpital's Rule, evaluate
$$\lim_{x \to \infty} \frac{6x^3(x-5)}{(3x^2+4)^2}$$
or show that it does not exist.

2. <u>Using</u> l'Hôpital's Rule, evaluate
$$\lim_{x \to \infty} \left(1 + \frac{7}{x}\right)^{2x}$$
or show that it does not exist.

3. Find the derivative of y with respect to x for each of the following functions.

   (a) $y = \dfrac{xe^x}{x^3+1}$

   (b) $y = \csc^4\left(\sqrt{\tan(x)}\right)$

   (c) $\sinh(x) + 3y = x^2\cos(y)$

4. Evaluate each of the following indefinite integrals.

   (a) $\displaystyle\int x^3 \ln(x)\, dx$

   (b) $\displaystyle\int \frac{3x^2 - 8x + 4}{x^3 + x^2 + 4x + 4}\, dx$

   (c) $\displaystyle\int x\sqrt{16 - x^2}\, dx$

   (d) $\displaystyle\int \sqrt{16 - x^2}\, dx$

5. Evaluate the definite integral $\displaystyle\int_{\frac{2}{3}}^{1} \frac{1}{\sqrt{12x - 9x^2}}\, dx$.