1. Show that there is a number x such that

$$10^x = x^2.$$

2. True or false: taxi fare is a continuous function of distance traveled. Justify your answer. You may assume this generous taxi does not charge for waiting time.

3. Consider the function

$$f(x) = \begin{cases} \cos(x) & x > 0 \\ -x^2 & x \leq 0 \end{cases}$$

a) Sketch $f(x)$.

b) Compute $\lim_{x \to 0^+} f(x)$.

c) Compute $\lim_{x \to 0^-} f(x)$.

d) Is $f(x)$ continuous at $x = 0$? Justify your answer.

4. Consider the function

$$f(x) = \frac{\tan(3x)}{x}$$

a) What is the value of $f(0)$?

b) Using a calculator, estimate $\lim_{x\to 0} \tan(3x)/x$. Be sure to put your calculator in radians mode!

c) For what value of a is

$$g(x) = \begin{cases} \tan(3x)/x & x \neq 0 \\ a & x = 0 \end{cases}$$

continuous at $x = 0$?