CSE541 Homework 1
Due Friday, April 4 at class time

1. Express 0.22 in binary with 10 significant bits. Show how you derived your solution.

2. Give the IEEE single-precision floating point presentation for $(-1011001.001101)_2$. Show how you derived your solution.

3. Let $x = 0.00034200152$ and let $y = 0.00034199152$.

   (a) How many significant digits are there in y.

   (b) To how many significant digits does y approximate x?

4. The diameter of a disk is measured to be $d \approx 10.234$ cm. What's the length of the disk's circumference? (Show the value of π you used in the calculation.)

5. Suppose you use the familiar formula

$$x = \frac{1}{2a}\Big(-b \pm \sqrt{b^2 - 4ac}\ \Big)$$

   to solve the equation $x^2 - 10^5 x + 1 = 0$ (thus, $a = 1, b = -10^5, c = 1$) with a machine that carries only eight decimal digits.

   (a) What are the two solutions (with eight decimal digits) you obtained?

   (b) You should have observed that one of the solutions is not accurate. What's the reason for that?

   (c) Propose a remedy and obtain a more accurate solution.

6. Experiment with your calculator (or computer) to find its machine epsilon (the smallest number ϵ such that $1 + \epsilon > 1$). You don't have to find the actual machine epsilon. Just give the smallest number you can find — and show how how you found it.