Homework 4

1. Determine the five-digit chopping and rounding values of the irrational number π.

2. Determine the absolute and relative errors when approximating x by $\hat{x}$ when

   (a) $x = 0.3000 \times 10^{-3}$ and $\hat{x} = 0.3100 \times 10^{-3}$

   (b) $x = 8!$ and $\hat{x} = 39900$

3. Suppose that $x = \frac{5}{7}$ and $y = \frac{1}{3}$. Use five-digit chopping for calculating $x + y, x - y, x \times y, x/y$. Find Absolute and relative errors in each case.

4. Let $x = 0.54617$ and $y = 0.54611$. Use four-digit arithmetic to approximate $x + y$ and determine the absolute and relative errors using rounding. How many significant digits does the result have?

5. Let $f(x) = \frac{xcosx - sinx}{x - sinx}$

   (a) Find $\lim_{x \to 0} f(x)$;

   (b) Use four-digit rounding arithmetic to evaluate $f(0.1)$;

   (c) Replace each trigonometric function with its third Maclaurin polynomial, and repeat part (b);

   (d) The actual value is$f(0.1) = -1.99899998$. Find the relative error for the values obtained in parts (b) and (c).

6. Convert the following base 10 numbers to binary:

   (a) 13

   (b) $\frac{3}{8}$

   (c) 1.32

7. Convert the following binary numbers to base 10:

   (a) 1010101

   (b) 1011.101

   (c) $10111.\overline{01}$

8. Find the two's complement in 8-bit representation of the following numbers:

(a) -5

(b) -17

9. Interpret 1001 1111 as a two's complement binary number, and give its decimal equivalent.