Note: Show all your operations in detail. The solutions that do not have enough details will be graded with zero points.

1. Find the representation of the given numbers in the requested base. Show details of the calculations.

   (a) $(6023)_{10} = (?)_8$

   (b) $(367.35)_{10} = (?)_2$

   (c) $(103607)_8 = (?)_{10}$

2. (P.25 Q.2) Compute the absolute error and relative error in approximations of p by p^*.

   (a) $p = e^{10}$, $p^* = 22000$

   (b) $p = 10^{\pi}$, $p^* = 1400$

   (c) $p = 8!$, $p^* = 39900$

   (d) $p = 9!$, $p^* = \sqrt{18\pi}(9/e)^9$

3. (P.27 Q.21) Suppose two points (x_0, y_0) and (x_1, y_1) are on a straight line with $y_1 \neq y_0$. Two formulas are available to find the x-intercept of the line:

$$x = \frac{x_0 y_1 - x_1 y_0}{y_1 - y_0} \quad \text{and} \quad x = x_0 - \frac{(x_1 - x_0) y_0}{y_1 - y_0}$$

   (a) Show that both formulas are algebraically correct.

   (b) Use the data $(x_0, y_0) = (1.31, 3.24)$ and $(x_1, y_1) = (1.93, 4.76)$ and three-digit rounding arithmetic to compute the x-intercept both ways. Which method is better, and why?

4. (P.35 Q.2) The number e is defined by $e = \sum_{n=0}^{\infty}(1/n!)$, where $n! = n(n-1)\cdots 2 \cdot 1$ for $n \neq 0$ and $0! = 1$. Use four-digit chopping arithmetic to compute the following approximations to e and determine the absolute and relative errors.

   (a) $e \approx \sum_{n=0}^{5} \frac{1}{n!}$

   (b) $e \approx \sum_{j=0}^{5} \frac{1}{(5-j)!}$

   (c) $e \approx \sum_{n=0}^{10} \frac{1}{n!}$

   (d) $e \approx \sum_{j=0}^{10} \frac{1}{(10-j)!}$

5. (P.37 Q.13) Describe the output of the following algorithm.

INPUT $n, x_1, x_2, \ldots, x_n$.
OUTPUT SUM.
Step 1 Set $SUM = x_1$.
Step 2 For $i = 2, 3, \ldots, n$ do Step 3.
  Step 3 $SUM = SUM + x_i$.
Step 4 OUTPUT SUM;
STOP