

1. (Sauer §0.2, #4) Convert the following base 10 numbers to binary. Use overbar notation for nonterminating binary numbers.
  - (a) 11.25
  - (b)  $2/3$
  - (c)  $3/5$
  - (d) 3.2
  - (e) 30.6
  - (f) 99.9
2. (Sauer §0.2, #8) Convert the following binary numbers to base 10.
  - (a) 11011
  - (b) 110111.001
  - (c)  $111.\overline{001}$
  - (d)  $1010.\overline{01}$
  - (e)  $10111.1\overline{0101}$
  - (f)  $1111.010\overline{001}$
3. (Sauer §0.3, #2) Convert the following base 10 numbers to binary and express each as a floating point number  $\text{fl}(x)$  by using the Rounding to Nearest Rule.
  - (a) 9.5
  - (b) 9.6
  - (c) 100.2
  - (d)  $44/7$
4. (Sauer §0.3, #4) Find the largest integer  $k$  for which  $\text{fl}(19 + 2^{-k}) > \text{fl}(19)$  in double precision floating point arithmetic.
5. (Sauer §0.3, #11) Does the associative law hold for IEEE computer addition? Explain your response.
6. (Sauer §0.4, #1) Identify for which values of  $x$  there is subtraction of nearly equal numbers, and find an alternate form that avoids the problem.
  - (a)  $\frac{1 - \sec^2(x)}{\tan(x)}$
  - (b)  $\frac{1 - (1 - x)^3}{x}$
  - (c)  $\frac{1}{1 + x} - \frac{1}{1 - x}$