

Home work 2: Due Thurs. Feb. 4, 2016 at the beginning of class

Math 2335 Spring 2016

**Name:** \_\_\_\_\_

(1) Calculate the error, relative error and number of significant digits in the following approximations  $x_A \approx x_T$ .

(a)  $x_T = \frac{1+\sqrt{5}}{2}$ ,  $x_A = 1.6$

(b)  $x_T = e$ ,  $x_A = 87/32$

(2) Use any combination(s) of algebra, identities, or Taylor polynomials to avoid loss of significance errors when the following expression is evaluated near the  $x$  values indicated.

(a)  $\sqrt{1 + \frac{1}{x}} - 1$ ,  $x$  very large (i.e. as  $x \rightarrow \infty$ )

(b)  $\frac{e^x - e^{-x}}{x}$ ,  $x \approx 0$

(3) Suppose  $x_A = 1.54$  is an approximation to  $x_T$  that is correctly rounded to the digits shown.

(a) Bound the error  $|\text{Err}(x_A)|$ .

(b) Bound the error  $|f(x_T) - f(x_A)|$  and the relative error  $|\text{Rel}(f(x_A))|$  in the approximation  $f(x_A) = e^{1.54}$ .