NUMERICAL ANALYSIS I - EXAM I

Show your work/steps

Name _____

Beginning with $[a_1, b_1] = [0, 1]$, use the bisection method to find the 5th iterate for a root of the equation $f(x) = x - 2^{-x} = 0$. Keep six digits after the decimal point. Summarize your results in the table below.

n	a_n	$f(a_n)$	b_n	$f(b_n)$	p_n	$f(p_n)$	Maximum error
1	0.00000		1.00000				
2							
3							
4							
5							

Determine the number of iterations required to obtain accuracy 10^{-5}.

Use three-digit rounding arithmetic to perform the following calculations. Compute the absolute error and relative error with the exact value determined to at least five digits.

$a)$ $\dfrac{\frac{13}{14} - \frac{6}{7}}{2e - 5.4}$

$b)$ $-10\pi + 6e - \dfrac{3}{62}$

Use the 64-bit long real format to find the decimal equivalent of the following floating point machine number.

1 01111111111 0101001100000000000000000000 00000000000000000000000000000000

Determine a solution accurate to within 10^{-3} for $3x - x^2 + e^x - 2 = 0$ using fixed-point iteration method. To get full credit for this problem find

1) an interval $[a, b]$ on which fixed-point iterations will converge,
2) k (an upper bound for $|g'(x)|$ on $[a, b]$),
3) n (the number of iterations required for accuracy 10^{-3} to be obtained),
4) perform the calculations.

Let $(x-2)^2 - \ln x = 0$ and $p_0 = 1.5$ Use Newton's method to find p_2.
(**Graduate students only!!!**) Use Newton's method to find p_2 to approximate one more root on $[e, 4]$.