# University of Central Florida
# Department of Electrical Engineering and Computer Science
# COT 4500 Numerical Calculus
# Assignment 1 (Spring 2013)

Due on February 30th in class.
For all exercises show all your work step by step.

1.- Use three-digit rounding arithmetic to perform the following calculations. Compute the absolute and relative error with the exact value determined to at least five digits.(10 points)

a) $(\frac{1}{3} - \frac{3}{11}) + \frac{3}{20}$

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

2.- Repeat exercise 1 using three-digit chopping arithmetic.(10 points)

3.- Why do the following functions not possess Taylor series expansions.(10 points)
a) $f(x) = \sqrt{x}$
b) $f(x) = \arcsin(x - 1)$

4.- Let $f(x) = \cos(x)$ and $x_0 = 0$. Determine the second polynomial, $P_2(x)$and$R_2(x)$ when $x = 0.01$, and give a bound for $\cos(x = 0.01)$(20 points)

5.- Assuming $e^8 = 2980.957987$. Compute $e^8$ using the $e^x$ series. Develop up to eleven terms and draw out your conclusion.(20 points)

6. Let $f(x) = 2x\cos(2x) - (x - 2)^2$ and $x_0 = 0$
a) Find the third Taylor polynomial $P_3(x)$, and use it to approximate $f(0.4)$.
b) Use the error formula in Taylor's Theorem to find an upper bound for the error $|f(0.4) - P_3(0.4)$. Compute the actual error.(20 points)

7.- The following binary floating-point numbers consist of a sign bit, an excess 64 exponent, and a 16 bit fraction. Normalize them. (10 points)

a) 110000010001010100000001
b) 001110000000001111111111