CS 3500 AA – Numerical Methods I
Fall 2015
Homework Problem Set #10
Due: 11/19/2015

Be sure to do all your work on separate paper, and include all steps where appropriate. All homework must follow the formatting rules posted on Blackboard.

1. For the given initial-value problem, find the indicated Picard iterate.
   (a) $y' = x^2 - 2y^2 + 1$, $y(0) = 0$, $y_2(x)$
   (b) $\dfrac{dy}{dx} = 2e^x + y$, $y(0) = 1$, $y_3(x)$
2. For the given initial-value problem, find the indicated Taylor approximating polynomial.
   (a) $y' = \cos(x) - y$, $y(0) = -1$, $p_3(x)$
   (b) $y' = e^x y$, $y(0) = 2$, $p_2(x)$
3. Apply Euler's method to approximate the solution of the initial-value problem over the indicated interval using n subintervals.
   (a) $\dfrac{dy}{dx} = y^3 - x$, $y(0) = 1$, $0 \le x \le 4$, $n = 4$
   (b) $\left(y^2 + 1\right)\dfrac{dy}{dx} = \ln\left(x^2 + 1\right)$, $y(0) = 0$, $0 \le x \le 1$, $n = 4$
4. Use the modified Euler's method approximate the solution to the following initial-value problem over the interval $1 \le x \le 6$ using $n = 5$ subintervals.
$$\frac{dy}{dx} = 1 + \frac{y}{x}, \quad y(1) = 1$$