Prince Sultan University
Department of Mathematics and Physical Sciences

Math 221
Major Exam 1
Fall 2014
Wednesday, Oct 22, 2014

Time Allowed: 60 minutes

Name:
Student Number:

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt to cheat will result in your exam being cancelled.

Total

80	**40**

Problem 1:

Let $f(x) = 1 - e^x + (e-1)sin\left(\frac{\pi}{2}x\right)$. Show that $f'(x) = 0$ at least once in $[0,1]$.

Problem 2:

Compute the absolute error and the relative error in approximation of $p = \pi$ by $p^* = 3.1416$.

Problem 3:

Let $f(x) = x^4 - 2x^3 - 4x^2 + 4x + 4$

Use the Bisection method on $[2,3]$ to find p_4.

Problem 4:

Use a fixed-point iteration method to determine a solution accurate to within 10^{-2} for $x^4 - 3x^2 - 3 = 0$ on $[1,2]$ use $p_0 = 1$.

Problem 5:

Use Newton's method to find solution accurate to within 10^{-4} for $x - \cos(x) = 0$, use $p_0 = \frac{\pi}{4}$.

Problem 6:

Let $f(x) = -x^3 - \cos(x)$, use Secant method, $p_0 = -1$ and $p_1 = 0$ to find p_3.

Problem 7:

Let $f(x) = \tan(x), x_0 = 0,\ x_1 = 0.6\ and\ x_2 = 0.9$. Construct interpolation polynomial of degree at most one and at most two to approximate $f(0.45)$.