# Prince Sultan University Department of Mathematics and Physical Sciences

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

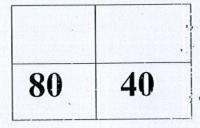
Time Allowed: 60 minutes

| 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**



#### Problem 1:

Let  $f(x) = 1 - e^x + (e - 1)sin(\frac{\pi}{2}x)$ . 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).