Prince Sultan University
Mathematics division

Name:

Numerical Analysis: Math 221

Garde:

----------**Major Exam 1**----------

Answer only 6 questions:

Question.1 (4 pts.) For the polynomial $p(z) = 3z^5 - 7z^4 - 5z^3 + z^2 - 8z + 2.$

a) Find a disk centered at the origin that contains all the zeros.

b) Find a disk centered at the origin that contains none of the zero

Question.2 (4 pts.) Let $f(x)=(x+2)(x+1)^2 x(x-1)^3(x-2)$. To which zero of *f* does the Bisection method converge when applied to $[-1.5,2.5]$.

Question.3 (4 pts.) Use Newton's method to find solutions of $x-\cos x=0$ on $[0,\pi/2]$. Apply 4 iterations.

Question.4 (4 pts.) Given $f(1)=0,\quad f(2)=0,\quad f'(1)=7$. Find a quadratic polynomial $p(x)$ interpolating $f(x)$.

Question.5 (4 pts.) Let $f(x)=\frac{1}{x+2}$. Give an error estimate for interpolating *f(x)* at three equally spaced points in [-1,+1].

Question.6 (4 pts.) Write the Newton interpolating polynomial for these data:

x	4	2	0	3
F(x)	63	11	7	28

Question.7 (4 pts.) Find a polynomial *f(x)* using Lagrange interpolation where *f(0)=1, f(1)=2 and f(2)=7.*