1/27/2006	MATH405 Numerical Analysis	Name:
Dr. Lunsford	Quiz 2	(20 Points Total)

Neatly show ALL of your work and CLEARLY indicate your answers. Use the back of the page if necessary. Write all numerical approximations to the accuracy of your calculator display.

I. Explain, using a basic theorem from calculus, why the equation  $\sin x + 3x^2 = \cos x$  has at least

one solution on the interval  $\left[0, \frac{\pi}{4}\right]$ . DO NOT try to find the solution. (5 points)

II. Find the 4<sup>th</sup> degree Taylor polynomial,  $P_4(x)$ , centered at  $\frac{\pi}{2}$  for the function  $\sin x$ . DO NOT simplify your answer. (6 points)

III. Use  $P_4(x)$  found above to approximate  $\sin(100^\circ)$ . (4 points)

IV. Use the Taylor remainder,  $R_4(x)$ , to find an upper bound for the absolute error of the approximation of  $\sin(100^\circ)$  using  $P_4(x)$ . Compare this to the actual absolute error (use your calculator approximation of  $\sin(100^\circ)$  as its actual value). (5 points)