Math 611 – Fall 2013 Take-home Midterm Exam, Due in Class on Nov 5th.

Instructions. *Show all your work. All work must be done in the examination booklets provides. No books, notes or scratch paper are allowed. Put your name on all exam booklets. Sign the honor code pledge. Check you work.*

Problem 1. (25 pts) In this problem first answer with either True or False. Then elaborate by giving an explanation or using an example to explain your answers.
(a) (4 pts) True or False: Newton's method for root finding is always of order 2 when applied to a continuous function $f(x)$.
(b) (4 pts) True or False: The degree of precision (p) of the Trapezoidal rule for numerical integration is always $p = 2$.
(c) (4 pts) True of False: It is not possible to convert the equation $x^3 - 5 = 0$ to a fixed-point problem. Explain if your answer is True. Give an example how it can be converted to a fixed-point problem if your answer is False.
(d) (4 pts) True of False: For $f(x) = 1 + x^5$, the Taylor polynomial of degree 6 about $x = 1$ would give large errors when x is far away from 1.
(e) (3 pts) True or False: Given n data points, the polynomial interpolation always give big errors near the end points.
(f) (3 pts) True or False: Simpson's rule for numerical integration is always better than the Trapezoidal rule.
(g) (3 pts) True or False: In general least squares approximation is better than polynomial interpolation.

Problem 2. (25 pts) Problem 7 on page 215.

Problem 3. (25 pts) Problem 21 on page 219.

Problem 4. (25 pts) Problem 7 on page 116.