

## M401 Spring 2010, Assignment 2, due Thursday February 4

1. [10 pts] In Assignment 1 we used Taylor's Theorem to solve Exercise 1.4 on p. 12 of Simmonds and Mann Jr. Solve the same problem using the expansion method.
2. [10 pts] Use the expansion method to find  $\mathbf{O}(\epsilon^2)$  approximations for each of the three roots of

$$x^3 + \epsilon x^2 + 1 = 0.$$

**Note.** For this problem it's useful to make use of the identity  $e^{i\pi} = -1$ .

3. [10 pts] Exercise 1.7 on p. 17 of Simmonds and Mann Jr.
4. [10 pts] Approximate the real-valued root of

$$(x - 1)^3 + \epsilon x = 0$$

with an error  $\mathbf{o}(\epsilon)$ .

5. [10 pts] Approximate the four roots of

$$(x - 1)^2(x^2 - 4) - \epsilon = 0,$$

with an error  $\mathbf{o}(\epsilon)$ .