

M401 Spring 2010, Assignment 3, due Thursday February 11

1. [10 pts] Exercise 1.5 on p. 15 of Simmonds and Mann Jr.
2. [10 pts] Find the first two terms in the expansions of each of the four roots of

$$\epsilon x^4 + \epsilon x^3 - x^2 + 2x - 1 = 0,$$

for $\epsilon \geq 0$.

3. [10 pts] Solve the ODE

$$\begin{aligned}y'' + 4y &= e^{5t}, \\y(0) &= 1 \\y'(0) &= 0.\end{aligned}$$

4. [10 pts] Solve the ODE

$$\begin{aligned}y'' + 4y &= 5 \cos(2t) \\y(0) &= 1 \\y'(0) &= 0.\end{aligned}$$

5. [10 pts] Use Taylor's Theorem to find the first two terms in a perturbation expansion of the solution of the ODE

$$\begin{aligned}y'' + k^2y &= \epsilon y^2, \\y(0) &= 1 \\y'(0) &= 0.\end{aligned}$$