

ESO 208A; ESO 218

Computational methods in engineering

Assignment # 10

Due date: November 7, 2013

1. Solve the following ODE from $t = 0$ to 3

$$dy/dt = y \sin^3(t)$$

$$y(0)=1$$

- a) Euler Method
 - b) Predictor-Corrector Method and,
 - c) SRK method.
2. Use finite difference method to solve the boundary value ODE

$$\frac{d^2u}{dx^2} + 6\frac{du}{dx} - u = 2$$

Boundary conditions, $u(0)=10$; $u(2)=1$. Use step size, $\Delta x=0.1$. Plot your results.

3. Determine the category of the following PDE.

$$\frac{\partial uh}{\partial t} + \frac{\partial}{\partial x}(u^2h + 0.5gh^2) = gh(S_o - S_f)$$

where, u and h are dependent variables and x and t are the independent variables, g and S_o are constants; S_f is a function of u and h .

4. Solve the Laplace equation for the following problem.
 - a. Square plate with sides 3 m.
 - b. BCs: right side, flux=0; top side, $T=20$; left side, $T=50$; Bottom side, $T=0$
 - c. Use $dx = dy = 1$ m.
 - d. Use Gauss-Seidel method.