

HOMWORK # 5, DUE FEBRUARY 7

**Problem 1**

Find first the general solution of the given differential equation, then find the solution which satisfies the given initial condition. Describe the behavior of the solution as  $t$  goes to infinity.

- (1)  $y'' + 4y = 0$ ,  $y(0) = 1$ ,  $y'(0) = 0$
- (2)  $y'' + 4y' + 5y = 0$ ,  $y(0) = 2$ ,  $y'(0) = -3$
- (3)  $4y'' - 4y = 0$ ,  $y(0) = 0$ ,  $y'(0) = 1$
- (4)  $y'' - 2y' + 5y = 0$ ,  $y(0) = -2$ ,  $y'(0) = 2$ .
- (5)  $y'' + 6y' + 10y = 0$ ,  $y(0) = 0$ ,  $y'(0) = 2$ .
- (6)  $9y'' - 6y' + y = 0$ ,  $y(0) = 1$ ,  $y'(0) = 0$ .
- (7)  $y'' - 2y' + y = 0$ ,  $y(0) = 3$ ,  $y'(0) = -1$ .

**Problem 2**

- (1) Problem 18 on page 164.
- (2) Problem 19 on page 164.
- (3) Problem 20 on page 164.
- (4) Problem 14 on page 172.

**Problem 3**

Find a differential equation whose general solution is

- (1)  $y(t) = c_1 e^{2t} \cos(t) + c_2 e^{2t} \sin(t)$ .
- (2)  $y(t) = c_1 e^{-2t} + c_2 t e^{-2t}$ .
- (3)  $y(t) = c_1 e^{-2t} + c_2 e^{2t}$ .

**Problem 4**

- (1) Problem 23 on page 173.
- (2) Problem 26 on page 173.
- (3) Problem 28 on page 173.

**Problem 5**

Solve Problem 18 on page 173.

**Bonus**

Problem 16 on page 172.