EXERCISE 16.1

1. Find the particular integral of each equation:
   (a) $y''(t) - 2y'(t) + 5y = 2$
   (b) $y''(t) + y'(t) = 7$
   (c) $y''(t) + 3y = 9$
   (d) $y''(t) + 2y'(t) - y = -4$
   (e) $y''(t) = 12$
2. Find the complementary function of each equation:
   (a) $y''(t) + 3y'(t) - 4y = 12$
   (b) $y''(t) + 6y'(t) + 5y = 10$
   (c) $y''(t) - 2y'(t) + y = 3$
   (d) $y''(t) + 8y'(t) + 16y = 0$
3. Find the general solution of each differential equation in Prob. 2, and then definitize the solution with the initial conditions $y(0) = 4$ and $y'(0) = 2$.

EXERCISE 16.3

Find the y_p and the y_c, the general solution, and the definite solution of each of the following:

1. $y''(t) - 4y'(t) - 8y = 0;\ y(0) = 3,\ y'(0) = 7$
2. $y''(t) + 4y'(t) + 8y = 2;\ y(0) = 2\frac{1}{4},\ y'(0) = 4$
3. $y''(t) + 3y'(t) + 4y = 12;\ y(0) = 2,\ y'(0) = 2$
4. $y''(t) - 2y'(t) + 10y = 5;\ y(0) = 6,\ y'(0) = 8\frac{1}{2}$
5. $y''(t) + 9y = 3;\ y(0) = 1,\ y'(0) = 3$
6. $2y''(t) - 12y'(t) + 20y = 40;\ y(0) = 4,\ y'(0) = 5$
7. Which of the differential equations in Probs. 1 to 6 yield time paths with (*a*) damped fluctuation; (*b*) uniform fluctuation; (*c*) explosive fluctuation?

Let the demand & supply functions be

① $Q_d = 42 - 4p - 4p' + p''$

$Q_s = -6 + 8p$ with $p(0) = 6$, $p'(0) = 4$.

Assuming market clearance at every point of time, find the time path $P(t)$.

② $Q_d = 9 - p + p' + 3p''$

$Q_s = -1 + 4p - p' + 5p''$ with $p(0) = 4$, & $p'(0) = 4$. Find the time path $P(t)$.