

**Solution** (#1655) The complementary function of the DE

$$y'' - 3y' + 2y = f(x)$$

is  $y = \alpha e^x + \beta e^{2x}$  where  $\alpha, \beta$  are constants.

(i)  $f(x) = \sin 2x$  - a particular solution is

$$Y(x) = -\frac{1}{20} \sin 2x + \frac{3}{20} \cos 2x.$$

(ii)  $f(x) = e^{3x}$  - a particular solution is  $Y(x) = \frac{1}{2}e^{3x}$ .

(iii)  $f(x) = e^x$  - a particular solution is  $Y(x) = -xe^x$ .

(iv)  $f(x) = xe^{2x}$  - a particular solution is  $Y(x) = (\frac{1}{2}x^2 - x)e^{2x}$ .

(v)  $f(x) = e^x \sin x$  - a particular solution is

$$Y(x) = \frac{1}{2}e^x(\cos x - \sin x).$$

(vi)  $f(x) = \sin^2 x = (1 - \cos 2x)/2$  - a particular solution is

$$\frac{1}{4} + \frac{3}{40} \sin 2x + \frac{1}{40} \cos 2x.$$