

## PROBLEMS ON UNDETERMINED COEFFICIENTS

1. A.

$$y = -x^3 + \frac{3}{2}x^2 - \frac{9}{2}x + \frac{13}{4} + c_1e^{-x} + c_2e^{2x}$$

B.

$$y = -2/3 x^3 + 1/12 x^4 + 3 x^2 + c_1e^{-x} + c_2xe^{-x} + c_3x + c_4$$

C.

$$y = e^{3x}/25 + c_1e^{-2x} + c_2xe^{-2x}$$

D.

$$y = x^4e^{-2x}/12 + c_1e^{-2x} + c_2xe^{-2x}$$

E.

$$y = \frac{7}{625} xe^{2x} \cos(3x) + \frac{88}{15625} e^{2x} \cos(3x) + \frac{24}{625} xe^{2x} \sin(3x) - \frac{234}{15625} \sin(3x) e^{2x} + c_1e^{-2x} + c_2xe^{-2x}$$

and

$$y = -\frac{24}{625} xe^{2x} \cos(3x) + \frac{234}{15625} e^{2x} \cos(3x) + \frac{7}{625} xe^{2x} \sin(3x) + \frac{88}{15625} \sin(3x) e^{2x} + c_1e^{-2x} + c_2xe^{-2x}$$

F.

$$y = 1/16 x^2 e^x \cos(2x) + 1/12 e^x \sin(2x) x^3 - \frac{1}{64} e^x \cos(2x) - 1/32 xe^x \sin(2x) + c_1e^x \cos(2x) + c_2e^x \sin(2x)$$

and

$$y = 1/32 e^x \cos(2x) x + 1/16 x^2 e^x \sin(2x) - 1/12 e^x \cos(2x) x^3 + c_1e^x \cos(2x) + c_2e^x \sin(2x)$$

2. Evaluate the following integrals (think of it as a differential equation).

A.

$$\int x^2 e^{2x} \sin(3x) dx = \left( -\frac{3}{13} x^2 + \frac{24}{169} x - \frac{18}{2197} \right) e^{2x} \cos(3x) + \left( \frac{2}{13} x^2 + \frac{10}{169} x - \frac{92}{2197} \right) e^{2x} \sin(3x) + C$$

B.

$$\int x^2 e^{2x} \cos(3x) dx = \left( \frac{2}{13} x^2 + \frac{10}{169} x - \frac{92}{2197} \right) e^{2x} \cos(3x) - \left( -\frac{3}{13} x^2 + \frac{24}{169} x - \frac{18}{2197} \right) e^{2x} \sin(3x) + C$$