

MATH 336

Answers to Fall 2012 Final Exam

$$\text{A1. } y(x) = \frac{-1}{x} + \frac{3}{8}x^2$$

$$\text{A2. } y(x) = \frac{4}{3 + \cos 4x}$$

$$\text{A3. } x^2y^{-1} + ye^{2x} - x + \frac{1}{3}y^3 = C$$

$$\text{A4. } y(x) = \pm x\sqrt{Cx^2 - 1}$$

$$\text{A5. } y(x) = c_1e^{3x} + c_2e^{-x} - \frac{2}{3}\cos 3x - \frac{1}{3}\sin 3x$$

$$\text{A6. } y(x) = c_1e^{-2x} + c_2e^{-4x} + \frac{1}{15}e^x + \frac{1}{2}xe^{-2x}$$

$$\text{A7. } y_p(x) = -xe^{-2x} + (\ln x)xe^{-2x}$$

$$\text{A8. } x(t) = \frac{4}{13}e^{-2t} + \frac{9}{13}\cos 3t - \frac{6}{13}\sin 3t$$

$$\text{A9. (a) } F(s) = \frac{2}{s^2} - \frac{2}{s^2}e^{-2s}$$

$$\text{(b) } f(t) = \left(2\cos 4t - \frac{11}{2}\sin 4t\right)e^{2t}$$

$$\text{A10. } x(t) = c_1e^{-3t} + c_2te^{-3t}, y(t) = (c_1 - \frac{1}{6}c_2)e^{-3t} + c_2te^{-3t}$$

$$\text{B1. (a) The initial-value problem } \frac{dv}{dt} = -32 - \frac{v}{10}, v(0) = 640 \text{ has solution}$$

$$v(t) = 960e^{-t/10} - 320.$$

$$\text{(b) } t = 10 \ln 3 \text{ sec.}$$

$$\text{B2. } \omega_0 = \sqrt{3}, C = \sqrt{12}, \alpha = -\pi/6.$$

$$\text{B3. } x(t) = 4(10 + t) - \frac{4000}{(10 + t)^2}.$$