Clave Tarea 2b

(13) $3y'' + 2y' + 2y = 0$

$3r^2 + 2r + 2 = 0$

$x = \frac{-2 \pm \sqrt{4 - 4(3)(2)}}{6} = \frac{-2 \pm \sqrt{-20}}{6} = -\frac{1}{3} \pm \frac{\sqrt{20}}{6}i$

$$\boxed{y = e^{-1/3x}\left(C_1 \cos \frac{\sqrt{20}}{6}x + C_2 \operatorname{sen} \frac{\sqrt{20}}{6}x\right)}$$

(26) $2\frac{d^5x}{ds^5} - 7\frac{d^4x}{ds^4} + 12\frac{d^3x}{ds^3} + 8\frac{d^2x}{ds^2} = 0$

$2r^5 - 7r^4 + 12r^3 + 8r^2 = 0$

$r^2(2r^3 - 7r^2 + 12r + 8) = 0$

$r^2\left(r + \frac{1}{2}\right)(2r^2 - 8r + 16) = 0$

$r_1 = r_2 = 0$

$r_3 = -\frac{1}{2}$

$r_4, r_5 = \frac{8 \pm \sqrt{64 - 4(2)(16)}}{4} = \frac{8 \pm \sqrt{-64}}{4} = 2 \pm \frac{8}{4}i$

$= 2 \pm 2i$

$$\boxed{y = C_1 + C_2 s + C_3 e^{-1/2s} + e^{2s}(C_4 \cos 2x + C_5 \operatorname{sen} 2x)}$$

(43) $y'' - 3y' + 2y = 0$ (f)

(44) $y'' - 3y' - 4y = 0$ (a)

(45) $y'' + 2y' + 2y = 0$ (e)

(46) $y'' + 2y' + y = 0$ (c)

(47) $y'' + y = 0$ (d)

(48) $y'' + 4y = 0$ (b)

(56) a) $\frac{d^2x}{dt^2} - \frac{64}{L}x = 0$

$r^2 - \frac{64}{L} = 0 \Rightarrow r = \pm \frac{8}{\sqrt{L}}$

$$\boxed{x = c_1 e^{+8/\sqrt{L}\,t} + c_2 e^{-8/\sqrt{L}\,t}}$$

b) $x(0) = x_0 \quad x'(0) = 0$

$x'(t) = \frac{8}{\sqrt{L}} c_1 e^{8/\sqrt{L}\,t} - \frac{8}{\sqrt{L}} c_2 e^{-\frac{8}{\sqrt{L}}t}$

$x(0) = c_1 + c_2 = x_0$

$x'(0) = \frac{8}{\sqrt{L}} c_1 - \frac{8}{\sqrt{L}} c_2 = 0 \qquad \frac{8}{\sqrt{L}} c_1 = \frac{8}{\sqrt{L}} c_2$

$c_1 = c_2$

$c_1 + c_1 = x_0 \Rightarrow \boxed{c_1 = \frac{x_0}{2} = c_2}$

$$\boxed{x(t) = \frac{x_0}{2} e^{8/\sqrt{L}\,t} + \frac{x_0}{2} e^{-8/\sqrt{L}\,t}}$$

c) $\frac{1}{2} e^{8/\sqrt{20}\,t} + \frac{1}{2} e^{-8/\sqrt{20}\,t} = 10$

$\cosh\left(\frac{8}{\sqrt{20}}t\right) = 10$

$\frac{8}{\sqrt{20}}t = 2.99 \qquad t \approx 1.67$

$x'(1.67) = \frac{8}{2\sqrt{20}} e^{8/\sqrt{20}(1.67)} - \frac{8}{2\sqrt{20}} e^{-8/\sqrt{20}(1.67)}$

$\approx 17.73 - 0.045$

$\approx \boxed{17.685 \text{ ft/seg}}$