Ben Ridenbaugh

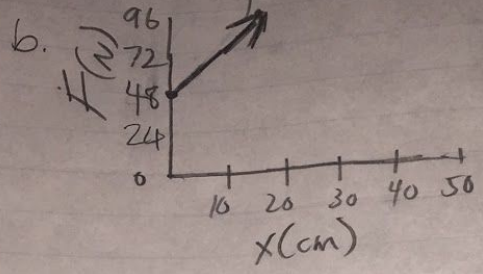
$F = Kx + F_i$

1-3. a. $m = K = \frac{222 - 135}{50 - 25} = \frac{87}{25} = 3.48$

$F_i \Rightarrow 135 = 3.48(25) + F_i \quad \therefore F_i = 48$

$F = 3.48x + 48$ N

b.



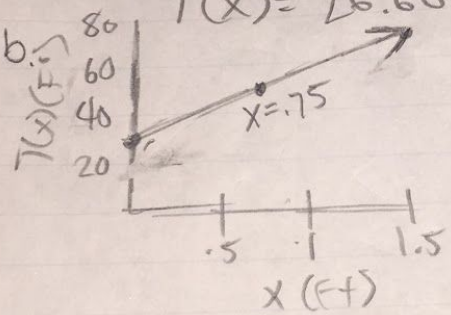
1-15 $T(x) = C_1x + C_2$

a. $C_1 = m = \frac{70 - 30}{1.5} = \frac{40}{1.5} = 26.66$

$C_2 \Rightarrow 30 = 26.66(0) + C_2 \quad \therefore C_2 = 30$

$T(x) = 26.66x + 30$ F

b.



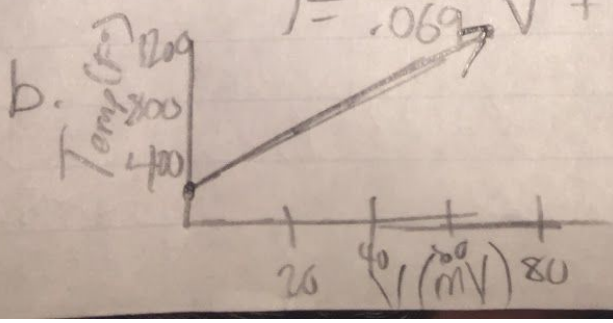
1-34 $T = \frac{1}{a}V + T_R$

a. $\frac{1}{a} = m = \frac{1235 - 373}{70 - 10} = \frac{862}{60} = 14.36 \quad \therefore a$

$T_R \Rightarrow 373 = 14.36(10) + T_R \quad \therefore T_R = 229.33$

$T = \frac{1}{.069}V + 229.33$ K

b.



$3R_1^2 + 100R_1$

2-6 $R = R_1 + \frac{R_1 R_2}{R_1 + R_2}$

a. $R = 100\,\Omega \qquad R_2 = 2R_1 + 100\,\Omega$

$\rightarrow 100 = R_1 + \frac{R_1(2R_1 + 100)}{R_1 + 2R_1 + 100}$

$100 = R_1 + \frac{2R_1^2 + 100R_1}{3R_1 + 100}$

$100 = \frac{3R_1^2 + 100R_1 + 2R_1^2 + 100R_1}{3R_1 + 100}$

$100 = \frac{5R_1^2 + 200R_1}{3R_1 + 100}$ ... ?

2-16. $h(t) = 1000 - 4.905t^2$

a. $921.52\,m = 1000 - 4.905t^2$

$t^2 = 16$

$t = 4\,s$

b. $686.08\,m = 1000 - 4.905t^2$

$t^2 = 64$

$t = 8\,s$

c. $509.5\,m = 1000 - 4.905t^2$

$t^2 = 100$

$t = 10\,s$

d. $0 = 1000 - 4.905t^2$

$t^2 = 203.87$

$t = 14.27\,s$

2-29. $s^2 + \frac{1}{RC}s + \frac{1}{LC} = 0 \qquad R = 200\,\Omega \quad L = 50\,mH \Rightarrow .05 \quad C = 0.2\,\mu F \Rightarrow .000000$

$s^2 + \frac{1}{200(.000002)}s + \frac{1}{.05(.000002)} = 0$

$s^2 + 25000s + 100000000 = 0$

Completing Square

$s^2 + 25000s + 100000000 + \left(\frac{25000}{2}\right)^2 = \left(\frac{25000}{2}\right)^2$

$(s + 25000)^2 = 5/250000$

$s = -5000, -20000$

Quadratic

$s = \frac{-25000 \pm \sqrt{25000^2 - 4(100000000)}}{2}$

$s = -5000, -20000$