8E HW: E.1 #5, 10 & E.2 #5, 10

5.) $N = 4 \times 1.332^t,\ t \geq 0.$

a.) $\boxed{4}$ b.) $4 \times 1.332^{16} = 392.7 \approx \boxed{393 \text{ people}}$

c.) $1200 = 4 \times 1.332^t$ Plug into calculator $Y_1 = 1200$

$Y_2 = 4 \times 1.332^x$

$\boxed{\approx 20 \text{ weeks}}$ window: Xmin: 0 Xmax: 25 Xscale: 2

Ymin: 0 Ymax: 1500 Yscale: 100

d.) $0 \leq t \leq 20$, because at 20 weeks the entire school is infected

10.) $V = c - k \times (0.8)^t\ ms^{-1}$

a.) when $t = 0$, the speed of descent is also 0 because the parachutist has not started the descent.

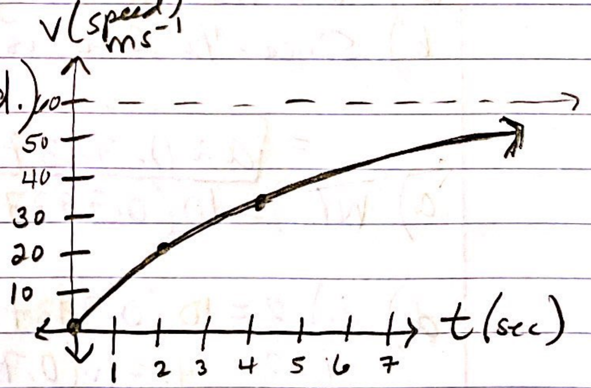
$\therefore\ 0 = c - k \times (0.8)^0$

$\Rightarrow\ 0 = c - k(1)$

$\Rightarrow\ 0 = c - k \quad \rightarrow \quad k = c$ ✓

$+k \qquad +k$

d.)



b.) $21.6 = c - k(0.8)^2$

$\Rightarrow 21.6 = k - 0.64k$ (since $c = k$)

$\frac{21.6}{0.36} = \frac{0.36k}{0.36}$

$k = 60 \quad \therefore \quad \boxed{V = 60 - 60(0.8)^t}$

c.) $V = 60 - 60(0.8)^4$ (type into calc)

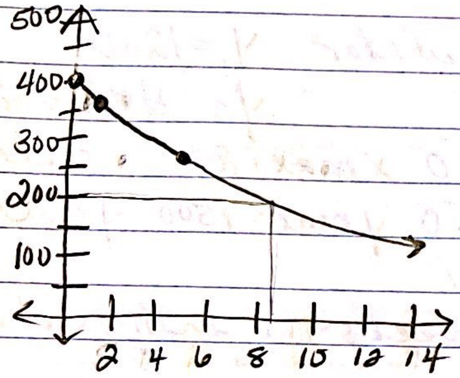
$= 35.424 \quad \therefore \boxed{35.4\,ms^{-1}}$

e. The parachutist accelerates rapidly until he approaches the terminal velocity of $60ms^{-1}$!

5.) a.) $P(t) = 400(0.92)^t$ $(1 - 0.08 = 0.92)$

b.) $P(1) = 400(0.92)^1 = 368$ orangutans
$P(5) = 400(0.92)^5 = 263.6 \approx 264$ orangutans

c.)



d.) $y_1 = 200$ $y_2 = 400(0.92)^x$

x-min: 0 y-min: 0
x-max: 10 y-max: 500
x-scale: 1 y-scale: 50

$\approx$ $\boxed{8.31 \text{ years}}$

10.) A "half-life" is the time period for something to reduce by 50%.

$W(t) = 10 \times a^t$ mg

a.) The initial weight of fermium-253 is 10mg.

b.) Since 1/2 life is 3 days $\rightarrow 5 = 10a^3 \rightarrow \frac{1}{2} = a^3 \rightarrow a = \sqrt[3]{\frac{1}{2}}$

$= \boxed{a \approx 0.7937} \rightarrow$ the weight decreases $\approx 20.63\%$ a day.

c.) $W(2) = 10(0.7937)^2 = \boxed{6.30 \text{ mg}}$

d.) i.) $3 = 10(0.7937)^t$ $\boxed{t = 5.21 \text{ days}}$

$y_1 = 3$ $y_2 = 10(0.7937)^x$

x-min: 0 y-mix: 0
x-max: 25 y-max: 10
x-scale: 5 y-scale: 1

ii.) $y_1 = 1.25$ $y_2 =$ same as i.

$\boxed{t = 9.00 \text{ days}}$