

#10 (a) $P(t) = 1800 \cdot b^t$

$$b = 1 + r \leftarrow$$

$$= 1 - 0.15$$

$$= 0.85$$

$$P(t) = 1800 (0.85)^t$$

$$(b) P(5) = 1800 (0.85)^5 = 799$$

$$(c) \frac{900}{1800} = \frac{\cancel{1800} (0.85)^t}{\cancel{1800}}$$

$$\frac{1}{2} = 0.85^t$$

$$\ln\left(\frac{1}{2}\right) = t \cdot \ln(0.85)$$

$$\frac{\ln\left(\frac{1}{2}\right)}{\ln(0.85)} = t \approx 4.27 \text{ days}$$

(7) 5 years ago = time $t=0$

$$P(t) = 40000 \cdot b^t$$

plug in $\left(\begin{matrix} t \\ 5, \end{matrix} \begin{matrix} P \\ 45500 \end{matrix} \right)$

$$\frac{45500}{40000} = \frac{\cancel{40000} b^5}{\cancel{40000}}$$

$$\rightarrow \left(\frac{91}{80} \right)^{1/5} = \left(b^5 \right)^{1/5}$$

$$(b) \quad 1.02610 = b = 1 + r$$

$$0.02610 = r = \underline{2.61\%}$$

per year

$$(a) \quad \boxed{P(t) = 40000 (1.02610)^t}$$

$$(c) \quad 50000 = 40000 (1.02610)^t$$

$$\ln \frac{5}{4} = t \cdot \ln(1.02610)$$

$$t = \ln(5/4) / \ln 1.02610 = 8.66 \text{ years}$$

#11

$$P(t) = 1450 \cdot b^t$$

plug in (4, 1750)

$$\frac{1750}{1450} = \frac{\cancel{1450} \cdot b^4}{\cancel{1450}}$$

$$\left(\frac{35}{29}\right)^{\frac{1}{4}} = \left(b^4\right)^{\frac{1}{4}} \quad (a^m)^n = a^{m \cdot n}$$

(b) $1.04814 = b$ growing at 4.81% per month

(a) $P(t) = 1450 (1.04814)^t$

(c) $2900 = 1450 (1.04814)^t$

$$2 = 1.04814^t$$

$$\ln 2 = t \cdot \ln 1.04814$$

$$\frac{\ln 2}{\ln 1.04814} = t = 14.7 \text{ months}$$

HW quiz 11-12-18

A town has a population of 8430. It is growing at 3.3% per year.

(a) What will the pop. be in 10 years?

(b) How long before the pop. reaches 10000?

More decay problems

A 100 g sample of carbon-10 decays to 69.81 g in 10 seconds.

Find the half-life of carbon-10.

$$m(t) = a \cdot b^t$$

↑ mass in grams

↑ amount at time $t = 0$

t ← time in seconds

$$m(t) = 100 \cdot b^t$$

plug in $(10, 69.81)$

$$69.81 = 100 \cdot b^{10}$$

$$0.6981 = b^{10}$$

$$(0.6981)^{1/10} = (b^{10})^{1/10}$$

$$0.96470 = b$$

$$m(t) = 100 (0.96470)^t$$

$$0.96470 = 1 + r$$

$$-0.0353 = r$$

-3.53% per sec

$$50 = 100 (0.96470)^t \leftarrow \text{half-life}$$

$$1/2 = 0.96470^t$$

$$t = \frac{\ln 1/2}{\ln 0.96470}$$

$$\ln(1/2) = t \cdot \ln 0.96470 \quad \uparrow = 19.3 \text{ secs}$$

HW word problems

12, 13, 14

Test Review for Test on

11/20/18