Section #1 TRUE/FALSE

#1 False. What is described is simple interest.

#2 False. The amount of money would increase as time period for compounding decreased (compound more often).

#3 False. What is described is geometric growth.

#4 True

#5 False. Depreciation is based on a modified compound interest formula.

#6 True.

#7 False. The amount paid towards principal is initially very small, and increases as time goes on (the payment amount stays the same, so the amount paid to interest decreases).

Section 2 MULTIPLE CHOICE

#1 $A = P(1+rt)$ $P = \$2500$ $r = 6\% = 0.06$ $t = 4$

$= \$2500\,(1 + 0.06 \times 4)$

$= \$3100$

#2 $APY = \left(1 + \frac{r}{m}\right)^m - 1$ $r = 5.3\% = 0.053$

$= \left(1 + \frac{0.053}{4}\right)^4 - 1$ $m = 4$

$= 0.0540627 \sim 5.4\%$

#3 $A = P(1+i)^n$ $P = \$2500$ $r = 6\% = 0.06$

$= \$2500\,(1+0.005)^{48}$ $m = 12$

$= \$31\,762.20$ $i = r/m = \frac{0.06}{12} = 0.005$

$n = 4 \times 12 = 48$

#4 $APY = \left(1 + r/m\right)^m - 1$ $r = 6\% = 0.06$

$= \left(1 + \frac{0.06}{12}\right)^{12} - 1$ $m = 12$

$= 0.0616778 \sim 6.168\%$

#5 simple interest since the accumulated amount is increasing linearly.

#6 ~~E~~. B ~~A~~ makes no sense since it decreased, then increased.

C

C ~~B~~ looks like compound interest

D ~~C~~ looks like simple interest

A ~~D~~ looks like depreciation.

Section 2 MULTIPLE CHOICE

#7 APR is 6% by definition.

#8

$$\frac{\text{CPI in 1987}}{\text{CPI in 2003}} = \frac{\text{cost house in 1987 dollars}}{\text{cost of house in 2003 dollars}}$$

$$\frac{113.6}{184.0} = \frac{\$24{,}000}{\text{cost of house in 2003 dollars}}$$

$$\text{cost of house in 2003 dollars} = \$24{,}000 \times \frac{184.0}{113.6}$$

$$= \$38{,}873.20$$

#9 B $\frac{70}{r}$ years.

#10 Equilibrium is where two curves intersect. This is at both 0 and ~~1~~. Answer is F.
0.9

#11

$$f(x) = 3x(1-x)$$

$$f(0.4) = 3(0.4)(1-0.4)$$

$$= 0.720.$$

#12

$$\text{Static reserve} = \frac{S}{u} = \frac{1476 \times 1{,}000,\cancel{000{,}000}}{30806 \times 1\cancel{{,}000{,}000}} = 47.9 \text{ years.}$$

$u = 84.4$ million per day

$= 84.4 \times 365$ per year

$= 30806$ million barrels per year.

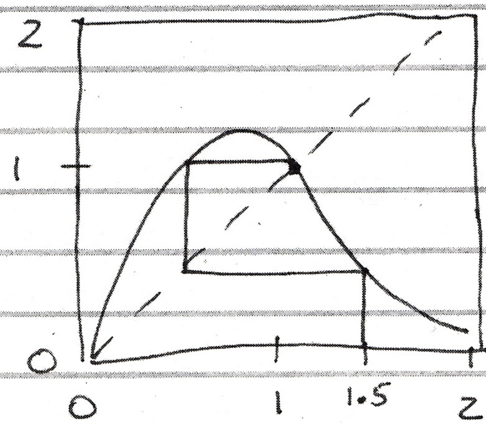
1 million = 1,000,000

1 billion = 1,000,000,000

Section 3 SHORT ANSWER

#1 Use rule of 70. $\frac{70}{1.8} = 39$ years for the population to double.

#2



#3 Use the compound interest formula.

$P(1+i)^n$

$= 315,645,000(1.018)^{27}$

$= 510,962,373$

$P = 315,645,000$

$i = 1.8\% = 0.018$ per year.

↳ $m = 1$

$n = 2040 - 2013 = 27$

#4 arithmetic growth → linear (simple interest).

$100 + 10 \times 12 = 220$

#5 Depreciation $V = P(1-i)^n$

$= \$25,000(1-0.15)^6$

$= \$9428.74.$

$P = \$25,000$

$i = 15\% = 0.15$

$n = 2013 - 2007 = 6.$

Section 3 SHORT ANSWER

#6

$\cancel{P = d\left[\frac{1-(1+i)^{-n}}{i}\right]}$

$P = \$99{,}000$

$i = \frac{r}{m} = \frac{0.06375}{12}$

$= 0.0053125$

$n = 360$

$$d = P\left[\frac{i}{1-(1+i)^{-n}}\right]$$

$$= \$99{,}000\left[\frac{0.0053125}{1-(1.0053125)^{-360}}\right]$$

$$= \$99{,}000\left[\frac{0.0053125}{0.8515397}\right]$$

$= \$617.631$ are the monthly payments.

The interest on the principal in the 1^{st} month is

$$P \times i = P \times \frac{r}{m} = \$99{,}000 \times 0.0053125$$
$$= \$525.938$$

Therefore, \$525.94 of the 1^{st} monthly payment goes toward interest. The rest,

$$\$617.63 - \$525.94 = \$91.69$$

goes towards principal.

Section 3 | SHORT ANSWER

#7 There are multiple ways to get this.

effective interest rate is $APY = \left(1+\frac{r}{m}\right)^m - 1$.

m = ... hmm, we don't know m! Let's go back to the definition: The effective interest rate is the <u>simple interest rate</u> that would give the same accumulated amount over the same time period.

this r is effective rate.

$$A = P(1 + rt)$$

$A = \$4632.10$

$P = 4532.10$

$t = 1$

$$4632.10 = 4532.10(1+r)$$

$$\frac{4632.10}{4532.10} - 1 = r$$

$$r = 0.0220648$$

$= 2.20648\%$, is the effective rate.

#8 Exponential reserve $= \dfrac{\ln\left[1+\frac{s}{u}\cdot r\right]}{\ln[1+r]}$

$\frac{s}{u} = 250$ (static reserve)

$r = 0.01 = 1\%$

$$= \frac{\ln[1+250\times 0.01]}{\ln[1+0.01]}$$

$$= \frac{\ln[3.5]}{\ln[1.01]}$$

~ 125.902 years.