(1) A
(2) C
(3) B
(4) D
(5) C
(6) D
(7) A
(8) A
(9) B
(10) D

(11)

First investment:
P= \$20,000, $t = 2.5$, $r = 0.012$, $m \to \infty \equiv$ continuous compounding. Solve for A:

$$\begin{aligned} A &= Pe^{rt} = 20,000e^{0.012\times 2.5} \\ &= 20,000e^{0.03} \\ &= 20,000(1.0304545) \\ &= \$20,609.09 \end{aligned}$$

Second investment:
$P = A$ from first investment, or \$20,609.09 , $t = 1$, $r = 0.02$, $m = 4$ (quarterly compounding).

$$\begin{aligned} A &= P(1+\frac{r}{m})^{mt} = 20,609.09(1+\frac{0.02}{4})^{4*1} \\ &= 20,609.09(1+0.005)^4 \\ &= 20,609.09(1.02015050) \\ &= \$21,024.37 \end{aligned}$$

(12) Your \$2,000 debt compounds continuously until it accumulates to \$2,500. Therefore we utilize the continuous compounding interest formula: $A = Pe^{rt}$, where A is the final asset value, P is the principal, r is the annual interest rate (as a decimal), and t is time in years.

We solve the following:

$$\begin{aligned} A &= Pe^{rt} \\ 2500 &= 2000e^{0.05t} \\ \frac{2500}{2000} &= e^{0.05t} \\ 1.25 &= e^{0.05t} \end{aligned}$$

Now, take the natural logarithm of both sides:

$$\begin{aligned} \ln(1.25) &= \ln(e^{0.05t}) = .05t \ln e = 0.05t * 1 \\ \frac{\ln(1.25)}{0.05} &= t \\ 4.46 &= t \end{aligned}$$

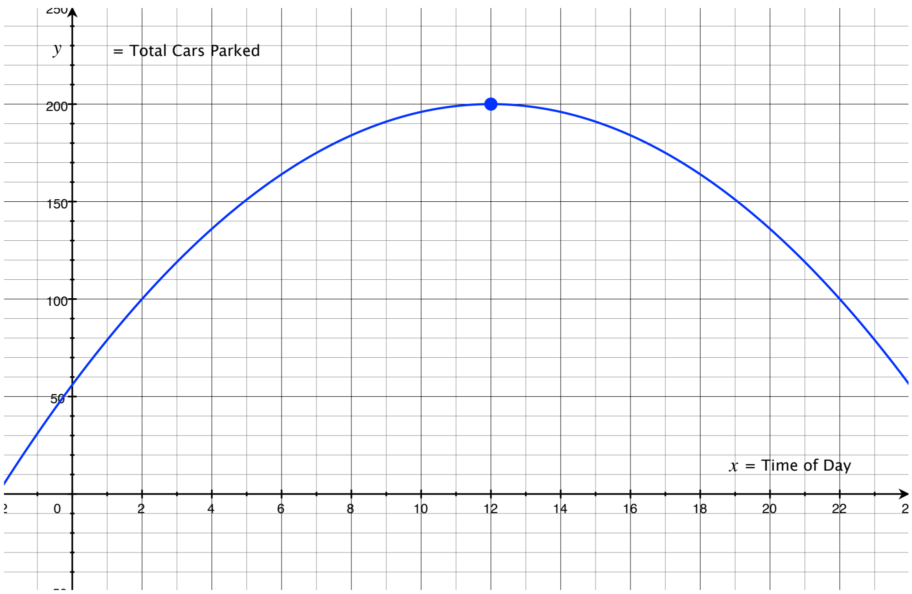
(13) An example from one of your peers:

1. A *nonlinear* model of valet operations at the Hotel Adam Smith NYC: Let P represent the total number of cars parked and x the time of day, where $x \in [0, 24]$.

$$P(x) = -(x-12)^2 + 200$$

2. From the early hours of the day the number of cars parked rises sharply (is positively sloped) until the peak hours (12pm), whereby the total number of cars plateaus (maximizes). After 12pm, the number of total cars parked decreases sharply.

(14) Graph of $P(x) = -(x-12)^2 + 200$:



GRADING SCALE

Raw Score	Final Score
32	100
31.5	99.5
30.5	98.5
30	98
29.5	97.5
29	97
28	96
26	94
24.5	92.5
23.5	91.5
23	91
22.5	90.5
20	88
19.5	87.5
17.5	85.5
17	85
16.5	84.5
10.5	78.5
9	77
8	76