Solutions 2

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1. First, we know that
$$FV = \$10,000.$$
And only two payments will be made. Even though the interest is compounded quarterly. So:
$$\begin{aligned} PMT &= \frac{10,000}{\left(\left(1+\frac{0.04}{4}\right)^3 + \left(1+\frac{0.04}{4}\right)^2\right)} \\ &= \$4,877.09 \end{aligned}$$

2. We must compare the values of FV:
$$FV = \frac{PMT}{I}[(1+I)^n - 1].$$
   (a) If $I = 0.07$: Choose option 3.
      i. Option 1:
$$\begin{aligned} FV &= PV \times (1+I)^n \\ &= \$61M \times (1.07)^{31} \\ &= \$496.85M \end{aligned}$$
      ii. Option 2:
$$\begin{aligned} T_{10} &= \frac{\$9.5M}{0.07}[(1.07)^{10} - 1] \\ &= \$131.26M \\ FV &= T_{10} \times (1.07)^{20} \\ &= \$507.92M \end{aligned}$$
      iii. Option 3:
$$\begin{aligned} FV &= \frac{\$5.5M}{0.07}[(1.07)^{30} - 1] \\ &= \$519.53M \end{aligned}$$
   (b) If $I = 0.08$, using same working: Choose option 1.
      i. Option 1: \$662.92M
      ii. Option 2: \$641.45M
      iii. Option 3: \$623.05M
   (c) If $I = 0.09$, using same working: Choose option 1.
      i. Option 1: \$882.16M
      ii. Option 2: \$808.90M
      iii. Option 3: \$749.69M
   (d) When I was below a certain threshold, The annual payments yielded more money by the end of their payout, but above this threshold, they yielded significantly less. All options return more every year, but the regular payments will pay more than the non payout option yearly when the interest rate approaches 0.

3. Use EAR:

   (a) Bank A, highest EAR.

   (b) See table:

Bank A	Bank B	Bank C
\$5,408	\$5,385	\$5,367

   (c) See table:

Bank B	Bank C
3.96%	3.92%

   (d) See table:

Bank A	Bank B	Bank C
\$4,807	\$2,476.78	\$13.46

4. Use amortisation:

   (a) Use modified formula for PV :

$$\begin{aligned} 150k &= \frac{PMT}{\frac{I}{M}}\left[1-\frac{1}{\left(1+\frac{I}{M}\right)^{n\times M}}\right] \\ &= \frac{PMT}{\frac{1}{150}}\left[1-\frac{1}{\left(1+\frac{1}{150}\right)^{360}}\right] \\ &= PMT\times 136.28 \\ PMT &= \$1,100.65 \end{aligned}$$

   (b) Remaining balance will be: \$148,792.23

5. Money required in bank account on 18th birthday: \$71,226.
   Amount that would be in savings just by compounding \$7.5k: \$10,037.
   Amount father has to make up for: \$61,189.
   Annual payments: \$10,854.84