CHAPTER 6
DISCOUNTED CASH FLOW VALUATION

Answers to Concepts Review and Critical Thinking Questions

1. The four pieces are the present value (PV), the periodic cash flow (*C*), the discount rate (*r*), and the number of payments, or the life of the annuity, *t*.

2. Assuming positive cash flows, both the present and the future values will rise.

3. Assuming positive cash flows, the present value will fall, and the future value will rise.

4. It's deceptive, but very common. The deception is particularly irritating given that such lotteries are usually government sponsored!

5. If the total money is fixed, you want as much as possible as soon as possible. The team (or, more accurately, the team owner) wants just the opposite.

6. The better deal is the one with equal installments.

7. Yes, they should. APRs generally don't provide the relevant rate. The only advantage is that they are easier to compute, but, with modern computing equipment, that advantage is not very important.

8. A freshman does. The reason is that the freshman gets to use the money for much longer before interest starts to accrue.

9. The subsidy is the present value (on the day the loan is made) of the interest that would have accrued up until the time it actually begins to accrue.

10. The problem is that the subsidy makes it easier to repay the loan, not obtain it. However, ability to repay the loan depends on future employment, not current need. For example, consider a student who is currently needy, but is preparing for a career in a high-paying area (such as corporate finance!). Should this student receive the subsidy? How about a student who is currently not needy, but is preparing for a relatively low-paying job (such as becoming a college professor)?

Solutions to Questions and Problems

Basic

1. PV@10% = \$1,300 / 1.10 + \$500 / 1.10^2 + \$700 / 1.10^3 + 1,620 / 1.10^4 = \$3,227.44
PV@18% = \$1,300 / 1.18 + \$500 / 1.18^2 + \$700 / 1.18^3 + 1,620 / 1.18^4 = \$2,722.41
PV@24% = \$1,300 / 1.24 + \$500 / 1.24^2 + \$700 / 1.24^3 + 1,620 / 1.24^4 = \$2,425.93

2. X@5%: PVA = $3,000{[1 – (1/1.05)^8] / .05 } = $19,389.64
Y@5%: PVA = $5,000{[1 – (1/1.05)^4] / .05 } = $17,729.75
X@22%: PVA = $3,000{[1 – (1/1.22)^8] / .22 } = $10,857.80
Y@22%: PVA = $5,000{[1 – (1/1.22)^4] / .22 } = $12,468.20

3. FV@8% = $900(1.08)^3 + $1,000(1.08)^2 + $1,100(1.08) + 1,200 = $4,688.14
FV@11% = $900(1.11)^3 + $1,000(1.11)^2 + $1,100(1.11) + 1,200 = $4,883.97
FV@24% = $900(1.24)^3 + $1,000(1.24)^2 + $1,100(1.24) + 1,200 = $5,817.56

4. PVA@15 yrs: PVA = $4,100{[1 – (1/1.10)^{15}] / .10} = $31,184.93
PVA@40 yrs: PVA = $4,100{[1 – (1/1.10)^{40}] / .10} = $40,094.11
PVA@75 yrs: PVA = $4,100{[1 – (1/1.10)^{75}] / .10} = $40,967.76
PVA@forever: PVA = $4,100 / .10 = $41,000.00

5. PVA = $20,000 = $*C*{[1 – (1/1.0825)^{12}] / .0825}; *C* = $20,000 / 7.4394 = $2,688.38

6. PVA = $75,000{[1 – (1/1.075)^8] / .075} = $439,297.77; can afford the system.

7. FVA = $1,500[(1.095^{20} – 1) / .095] = $81,183.35
FVA = $1,500[(1.095^{40} – 1) / .095] = $579,779.99

8. FVA = $50,000 = $*C*[(1.062^5 – 1) / .062]; *C* = $50,000 / 5.65965 = $8,834.47

9. PVA = $35,000 = $*C*{[1 – (1/1.10)^7] / .10}; *C* = $35,000 / 4.86842 = $7,189.19

10. PV = $5,000 / .09 = $55,555.56

11. PV = $58,000 = $5,000 / *r* ; *r* = $5,000 / $58,000 = 8.62%

12. EAR = [1 + (.12 / 4)]^4 – 1 = 12.55%
EAR = [1 + (.08 / 12)]^{12} – 1 = 8.30%
EAR = [1 + (.07 / 365)]^{365} – 1 = 7.25%
EAR = e$^{.16}$ – 1 = 17.35%

13.

EAR = .072 = [1 + (APR / 2)]^2 – 1;	APR = 2[(1.072)$^{1/2}$ – 1]	= 7.07%
EAR = .091 = [1 + (APR / 12)]^{12} – 1;	APR = 12[(1.091)$^{1/12}$ – 1]	= 8.74%
EAR = .185 = [1 + (APR / 52)]^{52} – 1;	APR = 52[(1.185)$^{1/52}$ – 1]	= 17.00%
EAR = .283 = e^{APR} – 1;	APR = ln 1.283	= 24.92%

14. First National: EAR = [1 + (.091 / 12)]^{12} – 1 = 9.49%
First United: EAR = [1 + (.092 / 2)]^2 – 1 = 9.41%

15. EAR = .14 = [1 + (APR / 365)]^{365} – 1; APR = 365[(1.14)$^{1/365}$ – 1] = 13.11%
The borrower is actually paying annualized interest of 14% per year, not the 13.11% reported on the loan contract.

16. FV = $600[1 + (.11/2)]^{40} = $5,107.99

17. FV in 5 years = $\$5{,}000[1 + (.063/365)]^{5(365)} = \$6{,}851.11$
FV in 10 years = $\$5{,}000[1 + (.063/365)]^{10(365)} = \$9{,}387.54$
FV in 20 years = $\$5{,}000[1 + (.063/365)]^{20(365)} = \$17{,}625.19$

18. PV = $\$19{,}000 / (1 + .12/365)^{6(365)} = \$9{,}249.39$

19. APR = 12(25%) = 300%; EAR = $(1 + .25)^{12} - 1 = 1{,}355.19\%$

20. PVA = $\$48{,}250 = \$C[1 - \{1 / [1 + (.098/12)]^{60}\} / (.098/12)]$; $C = \$48{,}250 / 47.284 = \$1{,}020.43$
EAR = $[1 + (.098/12)]^{12} - 1 = 10.25\%$

21. PVA = $\$17{,}805.69 = \$400\{ [1 - (1/1.015)^{t}] / .015\}$; $1/1.015^{t} = 1 - [(\$17{,}805.69)(.015) / (\$400)]$
$1.015^{t} = 1/(0.33223) = 3.0095$; $t = \ln 3.0095 / \ln 1.015 = 74$ months

22. $\$3(1 + r) = \$4$; $r = 4/3 - 1 = 33.33\%$ per week
APR = (52)33.33% = 1,733.33%; EAR = $[1 + .3333]^{52} - 1 = 313{,}916{,}515.70\%$

23. PV = $\$75{,}000 = \$1{,}050 / r$; $r = \$1{,}050 / \$75{,}000 = 1.40\%$ per month
Nominal return = 12(1.40%) = 16.80% per year; Effective return = $[1.0140]^{12} - 1 = 18.16\%$ per year

24. FVA = $\$100[\{[1 + (.11/12)]^{240} - 1\} / (.11/12)] = \$86{,}563.80$

25. EAR = $[1 + (.11/12)]^{12} - 1 = 11.57\%$
FVA = $\$1{,}200[(1.1157^{20} - 1) / .1157] = \$82{,}285.81$

26. PVA = $\$1{,}000\{[1 - (1/1.0075)^{16}] / .0075\} = \$15{,}024.31$

27. EAR = $[1 + (.14/4)]^{4} - 1 = 14.75\%$
PV = $\$800 / 1.1475 + \$700 / 1.1475^{2} + \$1{,}200 / 1.1475^{4} = \$1{,}920.79$

28. PV = $\$1{,}500 / 1.115 + \$7{,}200 / 1.115^{3} + \$900 / 1.115^{4} = \$7{,}121.66$

Intermediate

29. $(.06)(10) = (1 + r)^{10} - 1$; $r = 1.6^{1/10} - 1 = 4.81\%$

30. EAR = $.14 = (1 + r)^{2} - 1$; $r = (1.14)^{1/2} - 1 = 6.77\%$ per 6 months
EAR = $.14 = (1 + r)^{4} - 1$; $r = (1.14)^{1/4} - 1 = 3.33\%$ per quarter
EAR = $.14 = (1 + r)^{12} - 1$; $r = (1.14)^{1/12} - 1 = 1.10\%$ per month

31. FV = $\$3{,}000 [1 + (.029/12)]^{6} [1 + (.15/12)]^{6} = \$3{,}279.30$
Interest = $3,279.30 – $3,000.00 = $279.30

32. First: $\$95{,}000(.05) = \$4{,}750$ per year
($150,000 – 95,000) / $4,750 = 11.58 years
Second: $\$150{,}000 = \$95{,}000 [1 + (.05/12)]^{t}$
$t = 109.85$ months = 9.15 years

33. FV = $1(1.0172)^{12} = $1.23
FV = $1(1.0172)^{24} = $1.51

34. FV = $2,000 = $1,100(1 + .01)^{t}; t = 60.08 months

35. FV = $4 = $1(1 + r)^{(12/3)}; r = 41.42%

36. EAR = [1 + (.10 / 12)]^{12} – 1 = 10.4713%
PVA_1 = $75,000 {[1 – (1 / 1.104713)^{2}] / .104713} = $129,346.65
PVA_2 = $30,000 + $55,000{[1 – (1/1.104713)^{2}] / .104713} = $124,854.21

37. PVA = $10,000 [1 – (1/1.095)^{20} / .095] = $88,123.82

38. G: PV = –$30,000 + [$55,000 / (1 + r)^{6}] = 0; (1 + r)^{6} = 55/30; r = (1.833)^{1/6} – 1 = 10.63%
H: PV = –$30,000 + [$90,000 / (1 + r)^{11}] = 0; (1 + r)^{11} = 90/30; r = (3.000)^{1/11} – 1 = 10.50%

39. PVA falls as r increases, and PVA rises as r decreases
FVA rises as r increases, and FVA falls as r decreases
PVA@10% = $2,000{[1 – (1/1.10)^{10}] / .10} = $12,289.13
PVA@5% = $2,000{[1 – (1/1.05)^{10}] / .05} = $15,443.47
PVA@15% = $2,000{[1 – (1/1.15)^{10}] / .15} = $10,037.54

40. FVA = $18,000 = $95[{[1 + (.10/12)]^{N} – 1 } / (.10/12)];
1.00833^{N} = 1 + [($18,000)(.10/12) / 95]; N = ln 2.57894 / ln 1.00833 = 114.16 payments

41. PVA = $40,000 = $825[{1 – [1 / (1 + r)^{60}]}/ r];
solving on a financial calculator, or by trial and error, gives r = 0.727%; APR = 12(0.727) = 8.72%

42. PVA = $1,000[(1 – {1 / [1 + (.075/12)]}^{360}) / (.075/12)] = $143,017.63
balloon payment = ($180,000 – 143,017.63) [1 + (.075/12)]^{360} = $348,430.68

43. PV = $2,900,000/1.10 + $3,770,000/1.10^{2} + $4,640,000/1.10^{3} + $5,510,000/1.10^{4} + $6,380,000/1.10^{5} + $7,250,000/1.10^{6} + $8,120,000/1.10^{7} + $8,990,000/1.10^{8} + $9,860,000/1.10^{9} + $10,730,000/1.10^{10} = $37,734,712.25

44. PV = $3,000,000/1.10 + $3,900,000/1.10^{2} + $4,800,000/1.10^{3} + $5,700,000/1.10^{4} + $6,600,000/1.10^{5} + $7,500,000/1.10^{6} + $8,400,000/1.10^{7} = $26,092,064.36
The PV of Shaq's contract reveals that Robinson did achieve his goal of being paid more than any other rookie in NBA history. The different contract lengths are an important factor when comparing the present value of the contracts. A better method of comparison would be to express the cost of hiring each player on an annual basis. This type of problem will be investigated in a later chapter.

45. PVA = 0.80($1,200,000) = $9,300[{1 – [1 / (1 + r)]^{360}}/ r];
solving on a financial calculator, or by trial and error, gives r = 0.9347% per month
APR = 12(0.9347) = 11.22%; EAR = (1.009347)^{12} – 1 = 11.81%

46. PV = \$95,000 / 1.14^3 = \$64,122.29; the firm will make a profit
profit = \$64,122.29 – 57,000.00 = \$7,122.29
\$57,000 = \$95,000 / $(1 + r)^3$; $r = (95/57)^{1/3} – 1 = 18.56\%$

47. PV@0% = \$4 million; choose the 2nd payout
PV@10% = \$4 / 1.1^{10} = \$1,542,173.16 million; choose the 1st payout
PV@20% = \$4 / 1.2^{10} = \$646,022.33 million; choose the 1st payout

48. PVA = \$375,000{[1 – $(1/1.11)^{40}$] / .11} = \$3,356,644.06

49. PVA = \$1,000{[1 – $(1/1.12)^{13}$] / .12} = \$6,423.55
PV = \$6,423.55 / 1.12^7 = \$2,905.69

50. PVA_1 = \$1,500 [{1 – 1 / [1 + (.15/12)]^{48}} / (.15/12)] = \$53,897.22
PVA_2 = \$1,500 [{1 – 1 / [1 + (.12/12)]^{72}} / (.12/12)] = \$76,725.59
PV = \$53,897.22 + {\$76,725.59 / [1 + (.15/12)]^{48}} = \$96,162.01

51. A: FVA = \$1,000 [{[1 + (.115/12)]^{120} – 1} / (.115/12)] = \$223,403.23
B: FV = \$223,403.23 = PV $e^{.08(10)}$; PV = \$223,403.23 $e^{-.8}$ = \$100,381.54

52. PV@t=12: \$500 / .065 = \$7,692.31
PV@t=7: \$7,692.31 / 1.065^5 = \$5,614.47

53. PVA = \$20,000 = \$1,883.33{(1 – [1 / (1 + r)]^{12}) / r };
solving on a financial calculator, or by trial and error, gives r = 1.932% per month
APR = 12(1.932%) = 23.19%; EAR = $(1.01932)^{12} – 1$ = 25.82%

54. FV@5 years = \$30,000$(1.09)^3$ + \$50,000$(1.09)^2$ + \$85,000 = \$183,255.87
FV@10 years = \$183,255.87$(1.09)^5$ = \$281,961.41

55. Monthly rate = .14 / 12 = .0117; semiannual rate = $(1.0117)^6 – 1$ = 7.21%
PVA = \$8,000{[1 – (1 / $1.0721)^{10}$] / .0721 } = \$55,653.98
PV@t=5; \$55,653.98 / 1.0721^8 = \$31,893.27
PV@t=3; \$55,653.98 / 1.0721^{12} = \$24,143.51
PV@t=0; \$55,653.98 / 1.0721^{18} = \$15,902.03

56. *a.* PVA = \$475{[1 – $(1/1.105)^6$] / .105} = \$2,038.79
b. PVA = \$475 + \$475{[1 – $(1/1.105)^5$] / .105} = \$2,252.86

57. PVA = \$48,000 / [1 + (.0925/12)] = \$47,632.83
PVA = \$47,632.83 = \$$C${[{1 – {1 / [1 + (.0925/12)]^{48}}] / (.0925/12)}; C = \$1,191.01

58.

Year	Beginning Balance	Total Payment	Interest Payment	Principal Payment	Ending Balance
1	$20,000.00	$5,548.19	$2,400.00	$3,148.19	$16,851.81
2	16,851.81	5,548.19	2,022.22	3,525.98	13,325.83
3	13,325.83	5,548.19	1,599.10	3,949.10	9,376.73
4	9,376.73	5,548.19	1,125.21	4,422.99	4,953.75
5	4,953.75	5,548.19	594.45	4,953.75	0.00

In the third year, $1,599.10 of interest is paid.
Total interest over life of the loan = $2,400 + 2,022.22 + 1,599.10 + 1,125.21 + 594.45 = $7,740.97

59.

Year	Beginning Balance	Total Payment	Interest Payment	Principal Payment	Ending Balance
1	$20,000.00	$6,400.00	$2,400.00	$4,000.00	$16,000.00
2	16,000.00	5,920.00	1,920.00	4,000.00	12,000.00
3	12,000.00	5,440.00	1,440.00	4,000.00	8,000.00
4	8,000.00	4,960.00	960.00	4,000.00	4,000.00
5	4,000.00	4,480.00	480.00	4,000.00	0.00

In the third year, $1,440 of interest is paid.
Total interest over life of the loan = $2,400 + 1,920 + 1,440 + 960 + 480 = $7,200.00

60. $20,000 = $17,800 $(1 + r)$; $r = 12.36\%$
Because of the discount, you only get the use of $17,800, and the interest you pay on that amount is 12.36%, not 11%.

61. Net proceeds = $13,000(1 – .16) = $10,920
EAR = ($13,000 / $10,920) – 1 = 19.05%

62. $10,000(1.12) = $10,000(0.97)(1 + r); $r = (\$11,200 / \$9,700) – 1 = 15.46\%$

63. EAR = (1.14 / 0.98) – 1 = 16.33%; the effective rate is not affected by the loan amount, since it drops out when solving for r (see previous problem).

64. Refundable fee: With the $1,000 application fee, you will need to borrow $151,000 to have $150,000 after deducting the fee. Solve for the payment under these circumstances.

PVA = $151,000 = C {[1 – 1/(1.00708)^{360}]/.00708} and C = $1,161.06
Plug this monthly payment into the PVA formula.
PVA = $150,000 = $1,161.06[{1 – [1 / (1 + r)]^{360} }/ r];
Solving on a financial calculator, or by trial and error, gives r = 0.7144% per month
APR = 12(0.7144%) = 8.57%
EAR = [1 + (.0857/12)]^{12} – 1 = 8.92%

Nonrefundable fee: APR = 8.50%
EAR = [1 + (.085/12)]^{12} – 1 = 8.84%

65. PVA = \$1,000 = (\$41.15)[{1 – [1 / (1 + *r*)]^{36} } / *r*];
solving on a financial calculator, or by trial and error, gives *r* = 2.30% per month
APR = 12(2.30%) = 27.60%; EAR = $(1.0230)^{12} - 1$ = 31.38%
It's called add-on interest because the interest amount of the loan is added to the principal amount of the loan before the loan payments are calculated.

66. *a.* PVA = \$80,000{[1 – $(1/1.09)^{15}$] / .09} = \$644,855.07
FVA = \$644,855.07 = \$C[(1.09^{30} – 1) / .09]; C = \$4,730.88

b. FV = \$644,855.07 = PV$(1.09)^{30}$; PV = \$48,603.46

c. FV of trust fund deposit = \$30,000$(1.09)^{10}$ = \$71,020.91
FVA = \$644,855.07 – 71,020.91 = \$C[(1.09^{30} – 1) / .09]; C = \$4,209.85
Worker's contribution = \$4,209.85 – 1,500 = \$2,709.85

67. Without fee and annual rate = 17.90%:
\$10,000 = \$200{[1 – $(1/1.0149167)^{t}$] / .0149167 } where .0149167 = .179/12
t = 92.51 months
Without fee and annual rate = 8.90%:
\$10,000 = \$200{[1 – $(1/1.00741667)^{t}$] / .00741667 } where .00741667 = .089/12
t = 62.71 months
With fee and annual rate = 8.90%:
\$10,200 = \$200{ [1 – $(1/1.00741667)^{t}$] / .00741667 } where .00741667 = .089/12
t = 64.31 months

68. FV_1 = \$750$(1.10)^5$ = \$1,207.88
FV_2 = \$750$(1.10)^4$ = \$1,098.08
FV_3 = \$850$(1.10)^3$ = \$1,131.35
FV_4 = \$850$(1.10)^2$ = \$1,028.50
FV_5 = \$950$(1.10)^1$ = \$1,045.00
Value at year six = \$1,207.88 + 1,098.08 + 1,131.35 + 1,028.50 + 1,045.00 + 950.00 = \$6,460.81
FV = \$6,460.81$(1.06)^{59}$ = \$201,063.32
The policy is not worth buying; the future value of the policy is \$201K, but the policy contract will pay off \$175K.

69. Find the monthly payment assuming $t = 15 \times 12 = 180$
\$300,000 = \$*C*[{1 – [1 / (1.0075)]^{180}} / .0075] so *C* = \$3,042.80
Value of future payments @ t = 5: \$3,042.80[{1 – [1 / (1.0075)]^{120}} / .0075] = \$240,203.76

70. PVA = \$15,000[{1 – [1 / (1 + *r*)]^4 } / *r*] = FVA = \$5,000{[$(1 + r)^6 - 1$] / *r* }
$(1 + r)^{10} - 4.00(1 + r)^4 + 30.00 = 0$
By trial and error, or using a root-solving calculator routine, *r* = 14.52%

71. PV = \$8,000 / *r* = PVA = \$20,000[{1 – [1 / (1 + *r*)]^{10} } / *r*]
$0.4 = 1 - [1/(1 + r)]^{10}$; $.6^{1/10} = 1/(1 + r)$; r = 5.24%

72. EAR = $[1 + (.14/365)]^{365} - 1 = 15.02\%$
Effective 2-year rate = $1.1502^2 - 1 = 32.31\%$
PV@t=1 year ago: \$5,200 /.3231 = \$16,096.14
PV today = \$16,096.14(1.1502) = \$18,514.47
PV = \$16,096.14 / $(1 + .1502)^2$ = \$12,165.86

73. $$PVA = \frac{\$C}{(1+r)} + \frac{\$C}{(1+r)^2} + ... + \frac{\$C}{(1+r)^N}$$

$$PVA_{due} = \$C + \frac{\$C}{(1+r)} + ... + \frac{\$C}{(1+r)^{N-1}}$$

$$PVA_{due} = (1+r)\left(\frac{\$C}{(1+r)} + \frac{\$C}{(1+r)^2} + ... + \frac{\$C}{(1+r)^N} \right)$$

$PVA_{due} = (1 + r)\ PVA$

$FVA = \$C + \$C(1 + r) + \$C(1 + r)^2 + \ldots. + \$C(1 + r)^{N-1}$
$FVA_{due} = \$C(1 + r) + \$C(1 + r)^2 + \ldots. + \$C(1 + r)^N$
$FVA_{due} = (1 + r)[\$C + \$C(1 + r) + \ldots. + \$C(1 + r)^{N-1}]$
$FVA_{due} = (1 + r)FVA$

74. FV@*t*=7: $\$50{,}000(1.13)^7 = \$117{,}630.27$
$PVA_{due} = \$117{,}630.27 = (1.13)\ \$C\ \{[1 - (1/1.13)^{10}] / .13\}$; C = \$19,184.10

75. *a.* APR = 52(11%) = 572%; EAR = $1.11^{52} - 1 = 22{,}640.23\%$

b. APR = 572% / .89 = 642.70%; 642.70% / 52 = 12.36% ; r = 12.36% per week
EAR = $1.1236^{52} - 1 = 42{,}727.20\%$

c. PVA = \$63.95 = \$25[{1 – [1 / (1 + r)]^4}/ r];
using trial and error or a financial calculator gives r = 20.63% per week
APR = 52(20.63%) = 1,072.90%; EAR = $1.2063^{52} - 1 = 1{,}722{,}530.00\%$

Calculator Solutions

1.

CFo	$0	**CFo**	$0	**CFo**	$0
C01	$1,300	**C01**	$1,300	**C01**	$1,300
F01	1	**F01**	1	**F01**	1
C02	$500	**C02**	$500	**C02**	$500
F02	1	**F02**	1	**F02**	1
C03	$700	**C03**	$700	**C03**	$700
F03	1	**F03**	1	**F03**	1
C04	$1,620	**C04**	$1,620	**C04**	$1,620
F04	1	**F04**	1	**F04**	1
I = 10		I = 18		I = 24	
NPV CPT		NPV CPT		NPV CPT	
$3,227.44		$2,722.41		$2,425.93	

2.

Enter	8	5%		$3,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$19,389.64		
Enter	4	5%		$5,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$17,729.75		
Enter	8	22%		$3,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$10,857.80		
Enter	4	22%		$5,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$12,468.20		

3.

Enter	3	8%	$900		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$1,133.74
Enter	2	8%	$1,000		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$1,166.40

	N	I/Y	PV	PMT	FV
Enter	1	8%	$1,100		
Solve for					$1,188.00

FV = $1,133.74 + 1,166.40 + 1,188.00 + 1,200.00 = $4,688.14

	N	I/Y	PV	PMT	FV
Enter	3	11%	$900		
Solve for					$1,230.87

	N	I/Y	PV	PMT	FV
Enter	2	11%	$1,000		
Solve for					$1,232.10

	N	I/Y	PV	PMT	FV
Enter	1	11%	$1,100		
Solve for					$1,221.00

FV = $1,230.87 + 1,232.10 + 1,221.00 + 1,200.00 = $4,883.97

	N	I/Y	PV	PMT	FV
Enter	3	24%	$900		
Solve for					$1,715.96

	N	I/Y	PV	PMT	FV
Enter	2	24%	$1,000		
Solve for					$1,537.60

	N	I/Y	PV	PMT	FV
Enter	1	24%	$1,100		
Solve for					$1,364.00

FV = $1,715.96 + 1,537.60 + 1,364.00 + 1,200.00 = $5,817.56

4.

	N	I/Y	PV	PMT	FV
Enter	15	10%		$4,100	
Solve for			$31,184.93		

	N	I/Y	PV	PMT	FV
Enter	40	10%		$4,100	

Solve for $40,094.11

	N	I/Y	PV	PMT	FV
Enter	75	10%		$4,100	
Solve for			$40,967.76		

5.

	N	I/Y	PV	PMT	FV
Enter	12	8.25%	$20,000		
Solve for				$2,688.38	

6.

	N	I/Y	PV	PMT	FV
Enter	8	7.5%		$75,000	
Solve for			$439,297.77		

7.

	N	I/Y	PV	PMT	FV
Enter	20	9.5%	$1,500		
Solve for					$81,183.35

	N	I/Y	PV	PMT	FV
Enter	40	9.5%	$1,500		
Solve for					$579,779.99

8.

	N	I/Y	PV	PMT	FV
Enter	5	6.2%			$50,000
Solve for				$8,834.47	

9.

	N	I/Y	PV	PMT	FV
Enter	7	10%	$35,000		
Solve for				$7,189.19	

12.

	NOM	EFF	C/Y
Enter	12%		4
Solve for		12.55%	

	NOM	EFF	C/Y
Enter	8%		12
Solve for		8.30%	

Enter	7%		365		
	NOM	**EFF**	**C/Y**		
Solve for		7.25%			

13.

Enter		7.2%	2		
	NOM	**EFF**	**C/Y**		
Solve for	7.07%				
Enter		9.1%	12		
	NOM	**EFF**	**C/Y**		
Solve for	8.74%				
Enter		18.5%	52		
	NOM	**EFF**	**C/Y**		
Solve for	17.00%				

14.

Enter	9.1%		12		
	NOM	**EFF**	**C/Y**		
Solve for		9.49%			
Enter	9.2%		2		
	NOM	**EFF**	**C/Y**		
Solve for		9.41%			

15.

Enter		14%	365		
	NOM	**EFF**	**C/Y**		
Solve for	13.11%				

16.

Enter	40	5.5%	$600		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$5,107.99

17.

Enter	5×365	6.3% / 365	$5,000		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$6,851.11

	N	I/Y	PV	PMT	FV
Enter	10×365	6.3% / 365	$5,000		
Solve for					$9,387.54

	N	I/Y	PV	PMT	FV
Enter	20×365	6.3% / 365	$5,000		
Solve for					$17,625.19

18.

	N	I/Y	PV	PMT	FV
Enter	6×365	12% / 365			$19,000
Solve for			$9,249.39		

19.

	NOM	EFF	C/Y
Enter	300%		12
Solve for		1,355.19%	

20.

	N	I/Y	PV	PMT	FV
Enter	60	9.8% / 12	$48,250		
Solve for				$1,020.43	

21.

	N	I/Y	PV	PMT	FV
Enter		1.5%	$17,805.69	±$400	
Solve for	74				

22.

	NOM	EFF	C/Y
Enter	1,733.33%		52
Solve for		313,916,515.7%	

23.

	NOM	EFF	C/Y
Enter	16.80%		12
Solve for		18.16%	

24.

	N	I/Y	PV	PMT	FV
Enter	20×12	11% / 12		$100	
Solve for					$86,563.80

25.

Enter	11.00%		12		
	NOM	**EFF**	**C/Y**		
Solve for		11.57%			

Enter	20	11.57%		$1,200	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$82,285.81

26.

Enter	4×4	0.75%		$1,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$15,024.31		

27.

Enter	14.00%		4
	NOM	**EFF**	**C/Y**
Solve for		14.75%	

CF0	$0
C01	$800
F01	1
C02	$700
F02	1
C03	$0
F03	1
C04	$1,200
F04	1

I = 14.7523003%
NPV CPT
$1,920.79

28.

CFo	$0
C01	$1,500
F01	1
C02	$0
F02	1
C03	$7,200
F03	1
C04	$900
F04	1

I = 11.5%
NPV CPT
$7,121.66

31.

	N	I/Y	PV	PMT	FV
Enter	6	2.90% / 12	$3,000		
Solve for					$3,043.76

	N	I/Y	PV	PMT	FV
Enter	6	15% / 12	$3,043.76		
Solve for					$3,279.30

$3,279.30 – 3,000 = $279.30

32.

	N	I/Y	PV	PMT	FV
Enter		5% / 12	±$95,000		$150,000
Solve for	109.85				

109.85 / 12 = 9.15 years

33.

	N	I/Y	PV	PMT	FV
Enter	12	1.72%	$1		
Solve for					$1.23

	N	I/Y	PV	PMT	FV
Enter	24	1.72%	$1		
Solve for					$1.51

34.

	N	I/Y	PV	PMT	FV
Enter		1%	$1,100		±$2,000
Solve for	60.08				

35.

Enter	4		±$1		$4
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for		41.42%			

36.

Enter	10.00%		12		
	NOM	**EFF**	**C/Y**		
Solve for		10.47%			

Enter	2	10.47%		$75,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$129,346.65		

CFo	$30,000
C01	$55,000
F01	2

I = 10.47%
NPV CPT
$124,854.21

37.

Enter	20	9.5%		$10,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$88,123.82		

38.

Enter	6		±$30,000		$55,000
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for		10.63%			

Enter	11		±30,000		$90,000
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for		10.50%			

39.

Enter	10	10%		$2,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$12,289.13		

	N	I/Y	PV	PMT	FV
Enter	10	5%		$2,000	
Solve for			$15,443.47		

	N	I/Y	PV	PMT	FV
Enter	10	15%		$2,000	
Solve for			$10,037.54		

40.

	N	I/Y	PV	PMT	FV
Enter		10% / 12		±$95	$18,000
Solve for	114.16				

41.

	N	I/Y	PV	PMT	FV
Enter	60		$40,000	±$825	
Solve for		0.727%			

$0.727\% \times 12 = 8.72\%$

42.

	N	I/Y	PV	PMT	FV
Enter	360	7.5% / 12		$1,000	
Solve for			$143,017.63		

$\$180,000 - 143,017.63 = \$36,982.37$

	N	I/Y	PV	PMT	FV
Enter	360	7.5% / 12	$36,982.37		
Solve for					$348,430.68

43.

CF0	$0
C01	$2,900,000
F01	1
C02	$3,770,000
F02	1
C03	$4,640,000
F03	1
C04	$5,510,000
F04	1
C05	$6,380,000
F05	1
C06	$7,250,000
F06	1
C07	$8,120,000
F07	1
C08	$8,990,000
F08	1
C09	$9,860,000
F09	1
C010	$10,730,000

I = 10%
NPV CPT
$37,734,712.25

44.

CF0	$0
C01	$3,000,000
F01	1
C02	$3,900,000
F02	1
C03	$4,800,000
F03	1
C04	$5,700,000
F04	1
C05	$6,600,000
F05	1
C06	$7,500,000
F06	1
C07	$8,400,000
F07	1
C08	
F08	
C09	
F09	
C010	

I = 10%
NPV CPT
$26,092,064.36

45.

	N	I/Y	PV	PMT	FV
Enter	360		$960,000	±$9,300	
Solve for		0.935%			

APR = 0.935% × 12 = 11.22%

	NOM	EFF	C/Y
Enter	11.22%		12
Solve for		11.81%	

46.

	N	I/Y	PV	PMT	FV
Enter	3	14%			$95,000
Solve for			$64,122.29		

Profit = $64,122.29 – 57,000 = $7,122.29

	N	I/Y	PV	PMT	FV
Enter	3		±$57,000		$95,000
Solve for		18.56%			

47.

	N	I/Y	PV	PMT	FV
Enter	10	10			$4,000,000
Solve for			$1,542,173.16		

	N	I/Y	PV	PMT	FV
Enter	10	20			$4,000,000
Solve for			$646,022.33		

48.

	N	I/Y	PV	PMT	FV
Enter	40	11%		$375,000	
Solve for			$3,356,644.06		

49.

	N	I/Y	PV	PMT	FV
Enter	13	12%		$1,000	
Solve for			$6,423.55		

	N	I/Y	PV	PMT	FV
Enter	7	12%			$6,423.55
Solve for			$2,905.69		

50.

	N	I/Y	PV	PMT	FV
Enter	6×12	$12\% / 12$		$1,500	
Solve for			$76,725.59		

	N	I/Y	PV	PMT	FV
Enter	4×12	$15\% / 12$		$1,500	$76,725.59
Solve for			$96,162.01		

52. PV@ t = 12: $500 / 0.065 = $7,692.31

	N	I/Y	PV	PMT	FV
Enter	5	6.5%			$7,692.31
Solve for			$5,614.47		

53.

	N	I/Y	PV	PMT	FV
Enter	12		$20,000	±$1,883.33	
Solve for		1.932%			

APR = $1.923\% \times 12 = 23.19\%$

Enter	23.19%		12		
	NOM	**EFF**	**C/Y**		
Solve for		25.82%			

54.

Enter	3	9%	$30,000		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$38,850.87

Enter	2	9%	$50,000		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$59,405.00

Value at t = 5: $38,850.87 + 59,405.00 + 85,000 = $183,255.57

55. Monthly rate = .14 / 12 = .0117; semiannual rate = $(1.0117)^6 - 1 = 7.21\%$

Enter	10	7.21%		$8,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$55,653.98		

Enter	4	14.93%			$55,653.98
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$31,893.27		

Enter	6	14.93%			$55,653.98
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$24,143.51		

Enter	9	14.93%			$55,653.98
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$15,902.03		

56.

a.

Enter	6	10.5%		$475	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$2,038.79		

2nd BGN 2nd SET

b.

	N	I/Y	PV	PMT	FV
Enter	6	10.5%		$475	
Solve for			$2,252.86		

57. 2nd BGN 2nd SET

	N	I/Y	PV	PMT	FV
Enter	48	9.25% / 12	$48,000		
Solve for				$1,191.01	

60.

	N	I/Y	PV	PMT	FV
Enter	1		$17,800		±$20,000
Solve for		12.36%			

61.

	N	I/Y	PV	PMT	FV
Enter	1		$10,920		±$13,000
Solve for		19.05%			

62.

	N	I/Y	PV	PMT	FV
Enter	1		$9,700		±$11,200
Solve for		15.46%			

63.

	N	I/Y	PV	PMT	FV
Enter	1		$0.98		±$1.14
Solve for		16.33%			

64. Refundable fee: With the $1,000 application fee, you will need to borrow $151,000 to have $150,000 after deducting the fee. Solve for the payment under these circumstances.

	N	I/Y	PV	PMT	FV
Enter	30 × 12	8.5% / 12	$151,000		
Solve for				$1,161.06	

	N	I/Y	PV	PMT	FV
Enter	30 × 12		$150,000	±$1,161.06	
Solve for		0.714%			

APR = 0.714% × 12 = 8.57%

Enter	8.57%		12		
	NOM	**EFF**	**C/Y**		
Solve for		8.92%			

Without refundable fee. APR = 8.50%

Enter	8.50%		12		
	NOM	**EFF**	**C/Y**		
Solve for		8.84%			

65.

Enter	36		$1,000	±$41.15	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for		2.30%			

APR = 2.30% × 12 = 27.60%

Enter	27.60%		12		
	NOM	**EFF**	**C/Y**		
Solve for		31.38%			

66. What she needs at age 65:

Enter	15	9%		$80,000	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$644,855.07		

a.

Enter	30	9%			$644,855.07
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for				$4,730.88	

b.

Enter	30	9%			$644,855.07
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for			$48,603.46		

c.

Enter	30	9%		$1,500	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$204,461.31

Enter	10	9%	$30,000		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$71,020.91

At 65, she is short: $644,855.07 – 204,461.31 – 71,020.91 = $369,372.85

Enter	30	9%			$369,372.85
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for				$2,709.85	

67. Without fee:

Enter		17.9% / 12	$10,000	±$200	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	92.51				

Enter		8.9% / 12	$10,000	±$200	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	62.71				

With fee:

Enter		8.9% / 12	$10,200	±$200	
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for	64.31				

68. Value at Year 6:

Enter	5	10%	$750		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$1,207.88

Enter	4	10%	$750		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$1,098.08

Enter	3	10%	$850		
	N	**I/Y**	**PV**	**PMT**	**FV**
Solve for					$1,131.35

	N	I/Y	PV	PMT	FV
Enter	2	10%	$850		
Solve for					$1,028.50

	N	I/Y	PV	PMT	FV
Enter	1	10%	$950		
Solve for					$1,045.00

So, at Year 5, the value is: $1,207.88 + 1,098.08 + 1,131.35 + 1,028.50 + 1,045.00 + 950 = $6,460.81

At Year 65, the value is:

	N	I/Y	PV	PMT	FV
Enter	59	6%	$6,460.81		
Solve for					$201,063.32

The policy is not worth buying; the future value of the policy is $201K, but the policy contract will pay off $175K.

69.

	N	I/Y	PV	PMT	FV
Enter	15 × 12	9% / 12	$300,000		
Solve for				$3,042.80	

	N	I/Y	PV	PMT	FV
Enter	10 × 12	9% / 12		$3,042.80	
Solve for			$240,203.76		

70.

CFo	±$5,000
C01	±$5,000
F01	5
C02	$15,000
F02	4

IRR CPT

14.52%

74. The value at t = 7:

	N	I/Y	PV	PMT	FV
Enter	7	13%	$50,000		
Solve for					$117,630.27

2^{nd} BGN 2^{nd} SET

	N	I/Y	PV	PMT	FV
Enter	10	13%	$117,630.27		
Solve for				$19,184.10	

75.

a. APR = 11% × 52 = 572%

	NOM	EFF	C/Y
Enter	572%		52
Solve for		22,640.23%	

b.

	N	I/Y	PV	PMT	FV
Enter	1		$0.89		±$1.00
Solve for		12.36%			

APR = 12.36% × 52 = 642.70%

	NOM	EFF	C/Y
Enter	642.70%		52
Solve for		42,727.20%	

c.

	N	I/Y	PV	PMT	FV
Enter	4		$63.95	±$25	
Solve for		20.63%			

APR = 20.63% × 52 = 1,072.90%

	NOM	EFF	C/Y
Enter	1,072.90%		52
Solve for		1,722,530.00%	