Solutions to end-of-chapter problems
Engineering Economy, 7th edition
Leland Blank and Anthony Tarquin

Chapter 1
Foundations of Engineering Economy

1.1 The four elements are cash flows, time of occurrence of cash flows, interest rates, and measure of economic worth.

1.2 (a) Capital funds are money used to finance projects. It is usually limited in the amount of money available.

(b) Sensitivity analysis is a procedure that involves changing various estimates to see if/how they affect the economic decision.

1.3 Any of the following are measures of worth: present worth, future worth, annual worth, rate of return, benefit/cost ratio, capitalized cost, payback period, economic value added.

1.4 First cost: *economic*; leadership: *non-economic*; taxes: *economic*; salvage value: *economic*; morale: *non-economic*; dependability: *non-economic*; inflation: economic; profit: *economic*; acceptance: *non-economic*; ethics: *non-economic;* interest rate: *economic*.

1.5 Many sections could be identified. Some are: I.b; II.2.a and b; III.9.a and b.

1.6 Example actions are:

- Try to talk them out of doing it now, explaining it is stealing
- Try to get them to pay for their drinks
- Pay for all the drinks himself
- Walk away and not associate with them again

1.7 *This is structured to be a discussion question; many responses are acceptable.* It is an ethical question, but also a guilt-related situation. He can justify the result as an accident; he can feel justified by the legal fault and punishment he receives; he can get angry because it WAS an accident; he can become tormented over time due to the stress caused by accidently causing a child's death.

1.8 *This is structured to be a discussion question; many responses are acceptable.* Responses can vary from the ethical (stating the truth and accepting the consequences) to unethical (continuing to deceive himself and the instructor and devise some on-the-spot excuse).

Lessons can be learned from the experience. A few of them are:

- Think before he cheats again.
- Think about the longer-term consequences of unethical decisions.
- Face ethical-dilemma situations honestly and make better decisions in real time.

Alternatively, Claude may learn nothing from the experience and continue his unethical practices.

1.9 i = [(3,885,000 - 3,500,000)/3,500,000]*100% = 11% per year

1.10 (a) Amount paid first four years = 900,000(0.12) = $108,000

(b) Final payment = 900,000 + 900,000(0.12) = $1,008,000

1.11 i = (1125/12,500)*100 = 9%
i = (6160/56,000)*100 = 11%
i = (7600/95,000)*100 = 8%

The $56,000 investment has the highest rate of return.

1.12 Interest on loan = 23,800(0.10) = $2,380
Default insurance = 23,800(0.05) = $1190
Set-up fee = $300

Total amount paid = 2380 + 1190 + 300 = $3870

Effective interest rate = (3870/23,800)*100 = 16.3%

1.13 The market interest rate is usually 3 – 4 % above the expected inflation rate. Therefore,

Market rate is in the range 3 + 8 to 4 + 8 = 11 to 12% per year

1.14 PW = present worth; PV = present value; NPV = net present value; DCF = discounted cash flow; and CC = capitalized cost

1.15 P = $150,000; F = ?; i = 11%; n = 7

1.16 P = ?; F = $100,000; i = 12%; n = 2

1.17 P = $3.4 million; A = ?; i = 10%; n = 8

1.18 F = ?; A = $100,000 + $125,000?; i = 15%; n = 3

1.19 End-of-period convention means that all cash flows are assumed to take place at the end of the interest period in which they occur.

1.20 fuel cost: *outflow*; pension plan contributions: *outflow*; passenger fares: *inflow;* maintenance: *outflow*; freight revenue: *inflow;* cargo revenue: *inflow*; extra bag charges: *Inflow*; water and sodas: *outflow*; advertising: *outflow*; landing fees: *outflow*; seat preference fees: *inflow*.

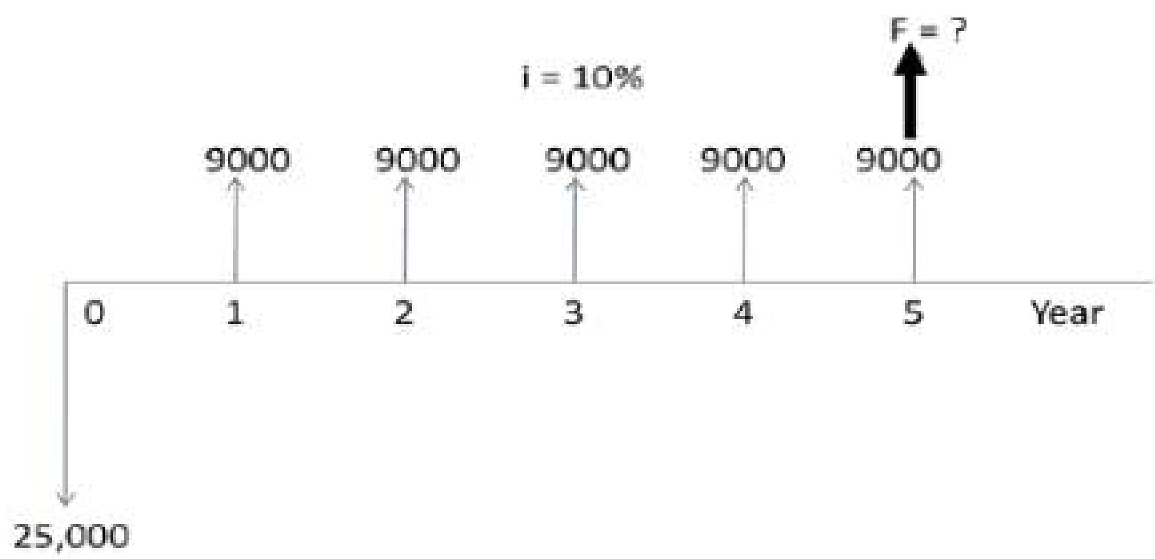
1.21 End-of-period amount for June = 50 + 70 + 120 + 20 = \$260
End-of-period amount for Dec = 150 + 90 + 40 + 110 = \$390

1.22

Month	Receipts, \$1000	Disbursements, \$1000	Net CF, \$1000
Jan	500	300	+200
Feb	800	500	+300
Mar	200	400	-200
Apr	120	400	-280
May	600	500	+100
June	900	600	+300
July	800	300	+500
Aug	700	300	+400
Sept	900	500	+400
Oct	500	400	+100
Nov	400	400	0
Dec	1800	700	+1100

Net Cash flow = \$2,920 (\$2,920,000)

1.23



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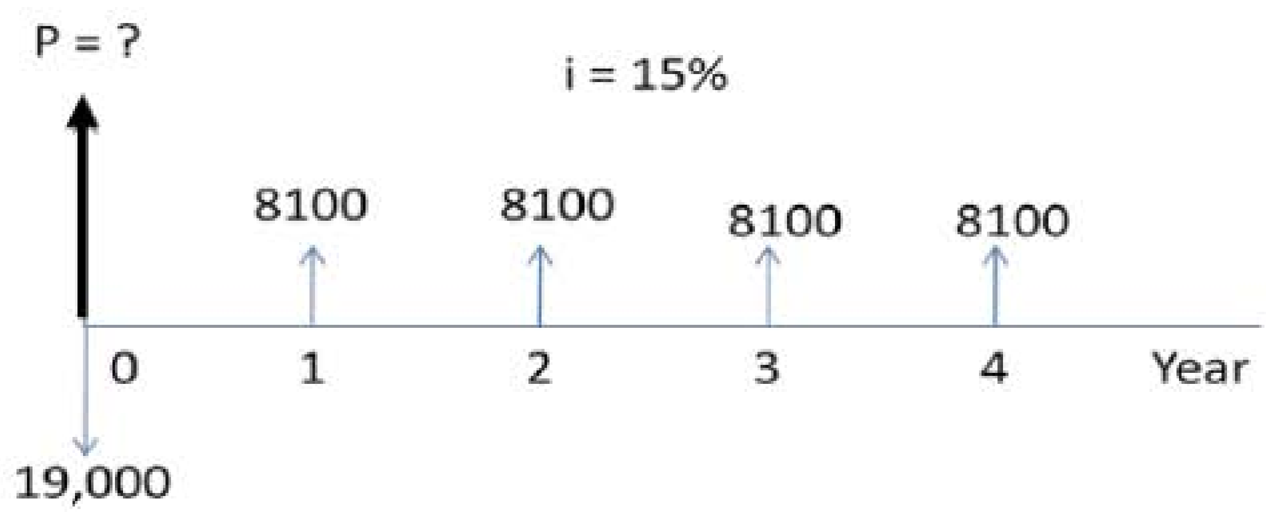

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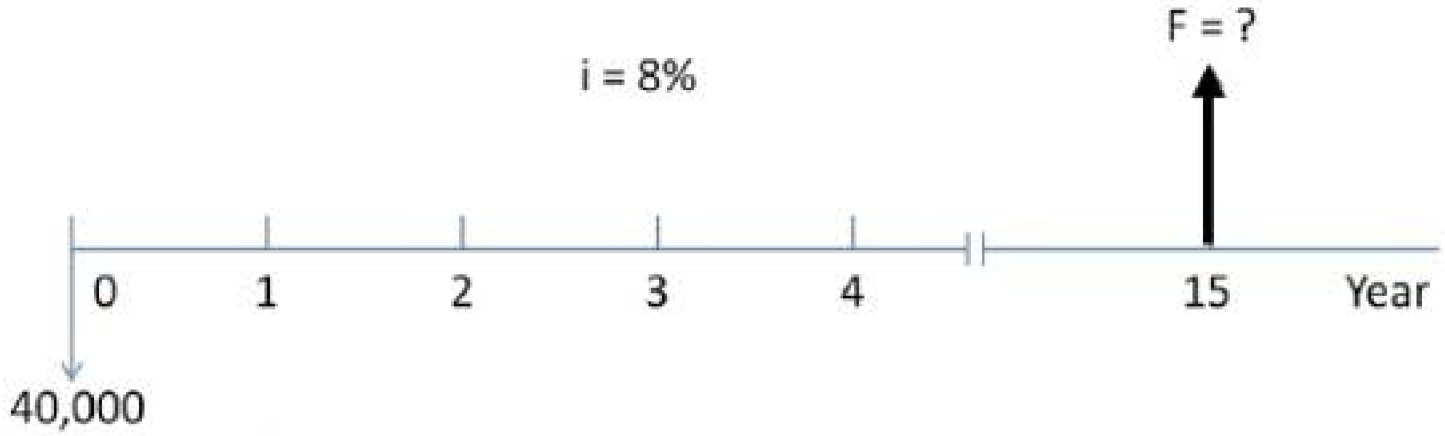

1.26 Amount now = F = 100,000 + 100,000(0.15) = $115,000

1.27 Equivalent present amount = 1,000,000/(1 + 0.15)
= $869,565

Discount = 790,000 – 869,565
= $79,565

1.28 5000(40)(1 + i) = 225,000
1 + i = 1.125
i = 0.125 = 12.5% per year

1.29 Total bonus next year = 8,000 + 8,000(1.08)
= $16,640

1.30 (a) Early-bird payment = 10,000 – 10,000(0.10) = $9000

(b) Equivalent future amount = 9000(1 + 0.10) = $9900

Savings = 10,000 – 9900 = $100

1.31 F_1 = 1,000,000 + 1,000,000(0.10)
= 1,100,000

F_2 = 1,100,000 + 1,100,000(0.10)
= $1,210,000

1.32 90,000 = 60,000 + 60,000(5)(i)
300,000 i = 30,000
i = 0.10 (10% per year)

1.33 (a) F = 1,800,000(1 + 0.10) (1 + 0.10) = $2,178,000

(b) Interest = 2,178,000 – 1,800,000 = $378,000

1.34 $F = 6{,}000{,}000(1 + 0.09)(1 + 0.09)(1 + 0.09)$
$= \$7{,}770{,}174$

1.35 $4{,}600{,}000 = P(1 + 0.10)(1 + 0.10)$
$P = \$3{,}801{,}653$

1.36 $86{,}400 = 50{,}000(1 + 0.20)^n$
$\log(86{,}400/50{,}000) = n(\log 1.20)$
$0.23754 = 0.07918n$
$n = 3$ years

1.37 Simple: $F = 10{,}000 + 10{,}000(3)(0.10)$
$= \$13{,}000$

Compound: $13{,}000 = 10{,}000(1 + i)(1 + i)(1 + i)$
$(1 + i)^3 = 1.3000$
$3\log(1 + i) = \log 1.3$
$3\log(1 + i) = 0.1139$
$\log(1 + i) = 0.03798$
$1 + i = 1.091$
$i = 9.1\%$ per year

1.38 Minimum attractive rate of return is also referred to as hurdle rate, cutoff rate, benchmark rate, and minimum acceptable rate of return.

1.39 bonds - *debt*; stock sales – *equity*; retained earnings – *equity*; venture capital – *debt*; short term loan – *debt*; capital advance from friend – *debt*; cash on hand – *equity*; credit card – *debt*; home equity loan - *debt*.

1.40 WACC = 0.30(8%) + 0.70(13%) = 11.5%

1.41 WACC = 10%(0.09) + 90%(0.16) = 15.3%

The company should undertake the inventory, technology, and warehouse projects.

1.42 (a) PV(i%,n,A,F) finds the present value P
(b) FV(i%,n,A,P) finds the future value F
(c) RATE(n,A,P,F) finds the compound interest rate i
(d) IRR(first_cell:last_cell) finds the compound interest rate i
(e) PMT(i%,n,P,F) finds the equal periodic payment A
(f) NPER(i%,A,P,F) finds the number of periods n

1.43 (a) NPER(8%,-1500,8000,2000): $i = 8\%$; $A = \$-1500$; $P = \$8000$; $F = \$2000$; $n = ?$
(b) FV(6%,10,2000,-9000): $i = 6\%$; $n = 10$; $A = \$2000$; $P = \$-9000$; $F = ?$
(c) RATE(10,1000,-12000,2000): $n = 10$; $A = \$1000$; $P = \$-12{,}000$; $F = \$2000$; $i = ?$
(d) PMT(11%,20,,14000): $i = 11\%$; $n = 20$; $F = \$14{,}000$; $A = ?$
(e) PV(8%,15,-1000,800): $i = 8\%$; $n = 15$; $A = \$-1000$; $F = \$800$; $P = ?$

1.44 (a) PMT is A (b) FV is F (c) NPER is n (d) PV is P (e) IRR is i

1.45 (a) For built-in functions, a parameter that does not apply can be left blank when it is not an interior one. For example, if there is no F involved when using the PMT function to solve a particular problem, it can be left blank (omitted) because it is an end parameter.
(b) When the parameter involved is an interior one (like P in the PMT function), a comma must be put in its position.

1.46 Spreadsheet shows relations only in cell reference format. Cell E10 will indicate $64 more than cell C10.

	A	B	C	D	E
1	Initial amount =	1000		i =	0.1
2					
3		Simple		Compound	
4	Year	Interest, $	Total, $	Interest, $	Total, $
5	0		= B1		= B1
6	1	= B1*E1	= C5 + B6	= $E5 * E1	= E5 + D6
7	2	= B1*E1	= C6 + B7	= $E6 * E1	= E6 + D7
8	3	= B1*E1	= C7 + B8	= $E7 * E1	= E7 + D8
9	4	= B1*E1	= C8 + B9	= $E8 * E1	= E8 + D9
10	Total	=SUM(B6:B9)	= C9	=SUM(D6:D9)	= E9

1.47 Answer is (b)

1.48 Answer is (d)

1.49 Answer is (a)

1.50 Answer is (d)

1.51 Upper limit = (12,300 – 10,700)/10,700 = 15%
Lower limit = (10,700 – 8,900)/10,700 = 16.8%

Answer is (c)

1.52 Amount one year ago = 10,000/(1 + 0.10) = $9090.90

Answer is (b)

1.53 Answer is (c)

1.54 2P = P + P(n)(0.04)
1 = 0.04n
n = 25

Answer is (b)

1.55 Answer is (a)

1.56 WACC = 0.70(16%) + 0.30(12%)
= 14,8%

Answer is (c)

Solution to Case Studies, Chapter 1

There is no definitive answer to case study exercises. The following are examples only.

Renewable Energy Sources for Electricity Generation

3. LEC approximation uses $(1.05)^{11} = 0.5847$, $X = P_{11} + A_{11} + C_{11}$ and LEC last year = 0.1022.

$$0.1027 = 0.1022 + \frac{X(0.5847)}{(5.052\text{ B})(0.5847)}$$

$X = \$2.526$ million

Refrigerator Shells

1. The first four steps are: Define objective, information collection, alternative definition and estimates, and criteria for decision-making.

Objective: Select the most economic alternative that also meets requirements such as production rate, quality specifications, manufacturability for design specifications, etc.

Information: Each alternative must have estimates for life (likely 10 years), AOC and other costs (e.g., training), first cost, any salvage value, and the MARR. The debt versus equity capital question must be addressed, especially if more than $5 million is needed.

Alternatives: For both A and B, some of the required data to perform an analysis are:
- P and S must be estimated.
- AOC equal to about 8% of P must be verified.
- Training and other cost estimates (annual, periodic, one-time) must be finalized.
- Confirm n = 10 years for life of A and B.
- MARR will probably be in the 15% to 18% per year range.

Criteria: Can use either present worth or annual worth to select between A and B.

2. Consider these and others like them:
   - Debt capital availability and cost
   - Competition and size of market share required
   - Employee safety of plastics used in processing

3. With the addition of C, this is now a make/buy decision. Economic estimates needed are:

   - Cost of lease arrangement or unit cost, whatever is quoted.
   - Amount and length of time the arrangement is available.

   Some non-economic factors may be:

   - Guarantee of available time as needed.
   - Compatibility with current equipment and designs.
   - Readiness of the company to enter the market now versus later

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Chapter 2
Factors: How Time and Interest Affect Money

2.1 (1) (P/F, 6%, 8) = 0.6274
(2) (A/P, 10%,10) = 0.16275
(3) (A/G,15%,20) = 5.3651
(4) (A/F,2%,30) = 0.02465
(5) (P/G,35%,15) = 7.5974

2.2 P = 21,300(P/A,10%,5)
= 21,300(3.7908)
= $80,744

2.3 Cost now = 142(0.60)
= $85.20
Present worth at regular cost = 142(P/F,10%,2)
= 142(0.8264)
= $117.35

Present worth of savings = 117.35 – 85.20
= $32.15

2.4 F = 100,000(F/P,10%,3) + 885,000
= 100,000(1.3310) + 885,000
= $1,018,100

2.5 F = 50,000(F/P,6%,14)
= 50,000(2.2609)
= $113,045

2.6 F = 1,900,000(F/P,15%,3)
F = 1,900,000(1.5209)
= $2,889,710

2.7 A = 220,000(A/P,10%,3)
= 220,000(0.40211)
= $88,464

2.8 P = 75,000(P/F,12%,4)
= 75,000(0.6355)
= $47,663

2.9 F = 1.3(F/P,18%,10)
= 1.3(5.2338)
= 6.80394 ($6,803,940)

2.10 P = 200,000(P/F,15%,1) + 300,000(P/F,15%3)
= 200,000(0.8696) + 300,000(0.6575)
= $371,170

2.11 Gain in worth of building after repairs = (600,000/0.75 – 600,000) - 25,000 = 175,000

F = 175,000(F/P,8%,5)
= 175,000(1.4693)
= $257,128

2.12 F = 100,000(F/P,8%,4) + 150,000(F/P,8%,3)
= 100,000(1.3605) + 150,000(1.2597)
= $325,005

2.13 P = (110,000* 0.3)(P/A,12%,4)
= (33,000)(3.0373)
= $100,231

2.14 P = 600,000(0.04)(P/A,10%,3)
= 24,000(2.4869)
= $59,686

2.15 A = 950,000(A/P,6%,20)
= 950,000(0.08718)
= $82,821

2.16 A = 434(A/P,8%,5)
= 434(0.25046)
= $108.70

2.17 F = (0.18 – 0.04)(100)(F/A,6%,8)
= 14(9.8975)
= $138.57

2.18 $F_{difference}$ = 10,500(F/P,7%,18) - 10,500(F/P,4%,18)
= 10,500(3.3799) - 10,500(2.2058)
= $12,328

2.19 F = (200 – 90)(F/A,10%,8)
= 110(11.4359)
= $1,257,949

2.20 $A = 350{,}000(A/F,10\%,3)$
$= 350{,}000(0.30211)$
$= \$105{,}739$

2.21 (a) 1. Interpolate between i = 12% and i = 14% at n = 15.

$$1/2 = x/(0.17102 - 0.14682)$$
$$x = 0.0121$$

$$(A/P,13\%,15) = 0.14682 + 0.0121$$
$$= 0.15892$$

2. Interpolate between i = 25% and i = 30% at n = 10.

$$2/5 = x/(9.9870 - 7.7872)$$
$$x = 0.8799$$

$$(P/G,27\%,10) = 9.9870 - 0.8799$$
$$= 9.1071$$

(b) 1. $(A/P,13\%,15) = [0.13(1 + 0.13)^{15}]/[(1 + 0.13)^{15} - 1]$
$= 0.15474$

2. $(P/G,27\%,10) = [(1 + 0.27)^{10} - (0.27)(10) - 1]/[0.27^2(1 + 0.27)^{10}]$
$= 9.0676$

2.22 (a) 1. Interpolate between n = 60 and n = 65:

$$2/5 = x/(4998.22 - 2595.92)$$
$$x = 960.92$$

$$(F/P,14\%,62) = 4998.22 - 960.92$$
$$= 4037.30$$

2. Interpolate between n = 40 and n = 48:
$$5/8 = x/(0.02046 - 0.01633)$$
$$x = 0.00258$$

$$(A/F,1\%,45) = 0.02046 - 0.00258$$
$$= 0.01788$$

(b) 1. $(F/P,14\%,62) = (1+0.14)^{62} - 1$
$= 3373.66$

2. $(A/F,1\%,45) = 0.01/[(1+ 0.01)^{45} - 1]$
$= 0.01771$

(c) 1. = -FV(14%,62,,1) displays 3373.66

3. = PMT(1%,45,,1) displays 0.01771

2.23 Interpolated value: Interpolate between n = 40 and n = 45:

$$3/5 = x/(72.8905 - 45.2593)$$
$$x = 16.5787$$

$$(F/P,10\%,43) = 45.2593 + 16.5787 = 61.8380$$

Formula value: $(F/P,10\%,43) = (1+0.10)^{43} - 1 = 59.2401$

% difference = [(61.8380 - 59.2401)/ 59.2401]*100 = 4.4%

2.24 Interpolated value: Interpolate between n = 50 and n = 55:

$$2/5 = x/(14524 - 7217.72)$$
$$x = 2922.51$$

$$(F/A,15\%,52) = 7217.72 + 2922.51 = 10{,}140$$

Formula value: $(F/A,15\%,52) = [(1+0.15)^{52} - 1]/0.15 = 9547.58$

% difference = [(10,140 - 9547.58)/ 9547.58](100)
= 6.2%

2.25 (a) Profit in year 5 = 6000 + 1100(4) = $10,400

(b) P = 6000(P/A,8%,5) + 1100(P/G,8%,5)
= 6000(3.9927) + 1100(7.3724)
= $32,066

2.26 (a) G = (241 – 7)/9 = $26 billion per year

(b) Loss in year 5 = 7 +4(26) = $111 billion

(c) A = 7 + 26(A/G,8%,10)
= 7 + 26(3.8713)
= $107.7 billion

2.27 A = 200 – 5(A/G,8%,8)
= 200 – 5(3.0985)
= $184.51

2.28 P = 60,000(P/A,10%,5) + 10,000(P/G,10%,5)
= 60,000(3.7908) + 10,000(6.8618)
= \$296,066

2.29 (a) CF_3 = 70 + 3(4) = \$82 (\$82,000)

(b) P = 74(P/A,10%,10) + 4(P/G,10%,10)
= 74(6.1446) + 4(22.8913)
= \$546.266 (\$546,266)

F = 546.266(F/P,10%,10)
= 521.687(2.5937)
= \$1416.850 (\$1,416,850)

2.30 601.17 = A + 30(A/G,10%,9)
601.17 = A + 30(3.3724)
A = \$500

2.31 P = 2.1B (P/F,18%,5)
= 2.1B (0.4371)
= \$917,910,000

917,910,000 = 50,000,000(P/A,18%,5) + G(P/G,18%,5)
917,910,000 = 50,000,000(3.1272) + G(5.2312)
G = \$14,557,845

2.32 75,000 = 15,000 + G(A/G,10%,5)
75,000 = 15,000 + G(1.8101)
G = \$33,147

2.33 First find P_g (using equation) and then convert to A

For n = 1: $P_g = \{1 - [(1 + 0.04)/(1 + 0.10)]^1\}/(0.10 - 0.04)$
= 0.90909

A = 0.90909(A/P,10%,1)
= 0.90909(1.1000)
= 1.0000

For n = 2: $P_g = \{1 - [(1 + 0.04)/(1 + 0.10)]^2\}/(0.10 - 0.04)$
= 1.7686

A = 1.7686(A/P,10%,2)
= 1.7686(0.57619)
= 1.0190

2.34 $P_g = 50{,}000\{1 - [(1 + 0.06)/(1 + 0.10)]^8\}/(0.10 - 0.06)$
$= \$320{,}573$

2.35 $P_{g1} = 10{,}000\{1 - [(1 + 0.04)/(1 + 0.08)]^{10}\}/(0.08 - 0.04)$
$= \$78{,}590$

$P_{g2} = 10{,}000\{1 - [(1 + 0.06)/(1 + 0.08)]^{11}\}/(0.08 - 0.06)$
$= \$92{,}926$

Difference = $14,336

2.36 $P_g = 260\{1 - [(1 + 0.04)/(1 + 0.06)]^{20}\}/(0.06 - 0.04)$
$= 260(15.8399)$
$= \$4118.37$ per acre-ft

2.37 $P = 30{,}000[10/(1 + 0.06)] = \$283{,}019$

2.38 18,000,000 = 3,576,420(P/A,i,7)
(P/A,i,7) = 5.0330

From interest tables in P/A column and n = 7, i = 9% per year.

Can be solved using the RATE function = RATE(7,3576420,18000000).

2.39 813,000 = 170,000(F/P,i,15)
$813{,}000 = 170{,}000(1 + i)^{15}$

log 4.78235 = (15)log (1 + i)
0.6796/15 = log (1 + i)
log (1 + i) = 0.04531

1 + i = 1.11
i = 11 % per year

Can be solved using the RATE function = RATE(15,,-170000,813000).

2.40 100,000 = 210,325(P/F,i,30)
(P/F,i,30) = 0.47545

Find i by interpolation between 2% and 3%, by solving the P/F equation for i, or by spreadsheet. By spreadsheet function = RATE(30,,100000,-210325), i = 2.51%.

2.41 $(1{,}000{,}000 - 1{,}900{,}000) = 200{,}000(F/P,i,4)$
$(F/P,i,4) = 4.5$

Find i by interpolation between 40% and 50%, by solving F/P equation, or by spreadsheet. By spreadsheet function = RATE(4,,-200000,900000), i = 45.7% per year.

2.42 $800{,}000 = 250{,}000(P/A,i,5)$
$(P/A,i,5) = 3.20$

Interpolate between 16% and 18% interest tables or use a spreadsheet. By spreadsheet function, i = 16.99% ≈ 17% per year.

2.43 $87{,}360 = 24{,}000(F/A,i,3)$
$(F/A,i,3) = 3.6400$

For n = 3 in F/A column, 3.6400 is in 20% interest table. Therefore, i = 20% per year.

2.44 $48{,}436 = 42{,}000 + 4000(A/G,i,5)$
$6436 = 4000(A/G,i,5)$
$(A/G,i,5) = 1.6090$

For n = 5 in A/G column, value of 1.6090 is in 22% interest table.

2.45 $600{,}000 = 80{,}000(F/A,15\%,n)$
$(F/A,15\%,n) = 7.50$

Interpolate in the 15% interest table or use a spreadsheet function. By spreadsheet, n = 5.4 years.

2.46 Starting amount = 1,600,000(0.55) = $880,000

$1{,}600{,}000 = 880{,}000(F/P,9\%,n)$
$(F/P,9\%,n) = 1.8182$

Interpolate in 9% interest table or use the spreadsheet function = NPER(9%,,-880000,1600000) to determine that $n = 6.94 \approx 7$ years.

2.47 $200{,}000 = 29{,}000(P/A,10\%,n)$
$(P/A,10\%,n) = 6.8966$

Interpolate in 10% interest table or use a spreadsheet function to display n = 12.3 years.

2.48 $1{,}500{,}000 = 18{,}000(F/A,12\%,n)$
$(F/A,12\%,n) = 83.3333$

Interpolate in 12% interest table or use the spreadsheet function

= NPER(12%, -18000,,1500000) to display n = 21.2 years. Time from now is

21.2 -15 = 6.2 years.

2.49 350,000 = 15,000(P/A,4%,n) + 21,700(P/G,4%,n)

Solve by trial and error in 4% interest table between 5 and 6 years to determine
$n \approx 6$ years

2.50 16,000 = 13,000 + 400(A/G,8%,n)
(A/G,8%,n) = 7.5000

Interpolate in 8% interest table or use a spreadsheet to determine that n = 21.8 years.

2.51
$$140(0.06 - 0.03) = 12\{1 - [(0.97170)]^x\}$$
$$4.2/12 = 1 - [0.97170]^x$$
$$0.35 - 1 = - [0.97170]^x$$
$$0.65 = [0.97170]^x$$

$$\log 0.65 = (x)(\log 0.97170)$$
$$x = 15 \text{ years}$$

2.52
135,300 = 35,000 + 19,000(A/G,10%,n)
100,300 = 19,000(A/G,10%,n)
(A/G,10%,n) = 5.2789

From A/G column in 10% interest table, n = 15 years.

2.53
$$88{,}146 = 25{,}000\{1 - [(1 + 0.18)/(1 + 0.10)]^n\}/(0.10 - 0.18)$$
$$3.52584 = \{1 - [(1.18)/(1.10)]^n\}/(-.08)$$
$$-0.28207 = \{1 - [(1.18)/(1.10]^n\}$$
$$-1.28207 = - [(1.18)/(1.10]^n$$
$$1.28207 = [(1.07273]^n$$

$$\log 1.28207 = n \log 1.07273$$
$$0.10791 = n(0.03049)$$
$$n = 3.54 \text{ years}$$

2.54 P = 30,000(P/F,12%,3)
= 30,000(0.7118)
= $21,354

Answer is (d)

2.55 30,000 = 4200(P/A,8%,n)
(P/A,8%,n) = 7.14286

n is between 11 and 12 years

Answer is (c)

2.56 A = 22,000 + 1000(A/G,8%,5) = $23,847

Answer is (a)

2.57 Answer is (d)

2.58 A = 800 – 100(A/G,4%,6) = $561.43

Answer is (b)

2.59 Answer is (b)

2.60 F = 61,000(F/P,4%,4)
= 61,000(1.1699)
= $71,364

Answer is (c)

2.61 P = 90,000(P/A,10%,10)
= 90,000(6.1446)
= $553,014

Answer is (d)

2.62 A = 100,000(A/P,10%,7)
= 100,000(0.20541)
= $20,541

Answer is (b)

2.63 A = 1,500,000(A/F,10%,20)
= 1,500,000(0.01746)
= $26,190

Answer is (a)

2.64 In \$1 million units

$A = 3(10)(A/P,10\%,10)$
$= 30(0.16275)$
$= \$4.8825 \quad (\approx \$4.9 \text{ million})$

Answer is (c)

2.65 $75{,}000 = 20{,}000(P/A,10\%,n)$
$(P/A,10\%,n) = 3.75$

By interpolation or NPER function, n = 4.9 years

Answer is (b)

2.66 $50{,}000(F/A,6\%,n) = 650{,}000$
$(F/A,6\%,n) = 13.0000$

By interpolation or NPER function, n = 9.9 years

Answer is (d)

2.67 $40{,}000 = 13{,}400(P/A,i,5)$
$(P/A,i,5) = 2.9851$

By interpolation or RATE function, i = 20.0 % per year

Answer is (a)

2.68 $P = 26{,}000(P/A,10\%,5) + 2000(P/G,10\%,5)$
$= 26{,}000(3.7908) + 2000(6.8618)$
$= \$112{,}284$

Answer is (b)

2.69 $F = [5000(P/A,10\%,20) + 1000(P/G,10\%,20)](F/P,10\%,20)$
$= [5000(8.5136) + 1000(55.4069)](6.7275)$
$= \$659{,}126$

Answer is (d)

2.70 $A = 300{,}000 - 30{,}000(A/G,10\%,4)$
$= 300{,}000 - 30{,}000(1.3812)$
$= \$258{,}564$

Answer is (b)

2.71 $F = \{5000[1 - (1.03/1.10)^{20}]/(0.10 - 0.03)\}(F/P,10\%,20)$
$= \{5000[1 - (1.03/1.10)^{20}]/(0.10 - 0.03)\}(6.7275)$
$= \$351,528$

Answer is (c)