Problem Solutions: Chapters 1 through 6

Chapter 1

Problem 1

Fuel Sells created an option to abandon the project. It is a put option. The strike price is $50 million. The option life is three years.

Problem 2

Seamless Transitions created an option to expand. It is a call option. The option price is $200 million. The strike price is $1 billion.

Problem 3

Priceless Polymers created an option to abandon. It was a put option. The strike price was $20 million. The option life was three years. At the time of expiration, the option was in the money. The value of the option at the time of exercise was $5 million.

Chapter 2

Problem 1

	Year					
	0	1	2	3	4	5
Capital cost, million	-$20.00					
Annual revenue, million		$15.00	$20.00	$25.00	$22.00	$52.00
Annual cost, million		$6.00	$7.00	$9.00	$8.00	$15.00
Annual net cash flow, million		$9.00	$13.00	$16.00	$14.00	$37.00
Discount rate	20%	20%	20%	20%	20%	20%
Discount factor*	1	0.83	0.69	0.58	0.48	0.40
PV of annual cash flows, million		$7.50	$9.03	$9.26	$6.75	$14.87
PV of net annual cash flows, million	$47.41					
NPV, million	$27.41					

*$1/(1+0.20)^n$ where n is the year number.

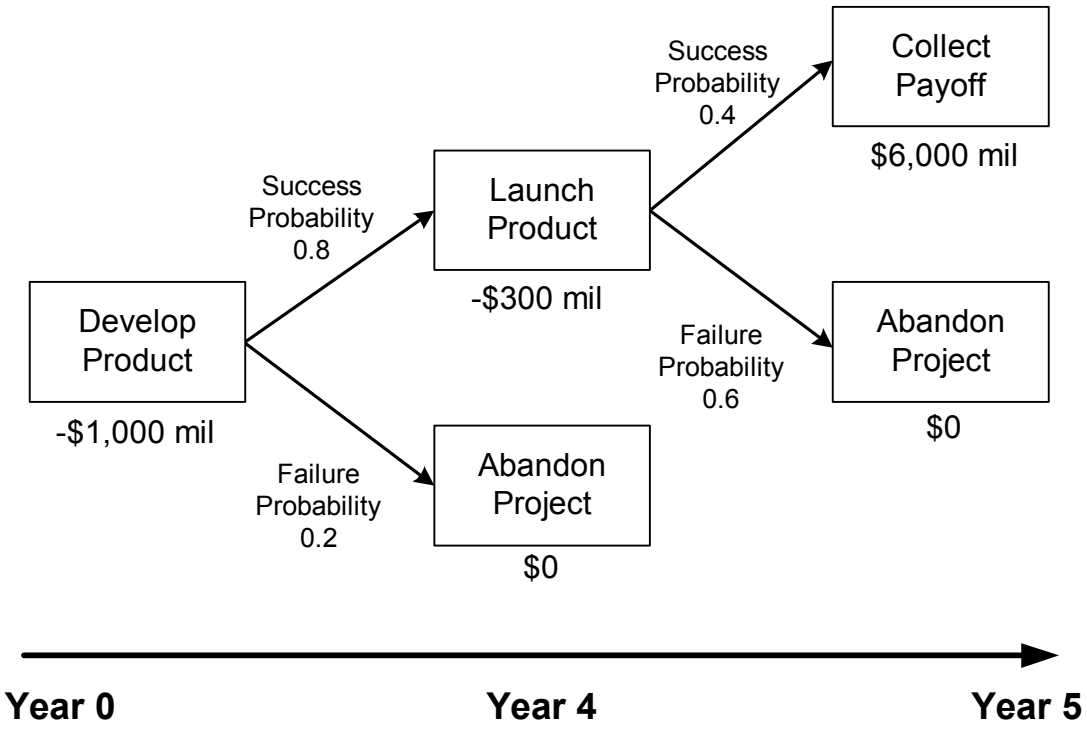
Problem 2

Variable			NPV	% NPV Change
Capital Cost	Base	$20	$27.41	
	+25%	$25	$22.41	-18%
	-25%	$15	$32.41	18%
Discount Rate	Base	20%	$27.41	
	+25%	25%	$21.57	-21%
	-25%	15%	$34.58	26%
Peak Annual Cost	Base	$9	$27.41	
	+25%	$11.3	$26.08	-5%
	-25%	$6.8	$28.68	5%
Peak Annual Revenue	Base	$25	$27.41	
	+25%	$31	$30.88	13%
	-25%	$19	$23.94	-13%

Problem 3

See the Excel spreadsheet: "Chapter 2 Problem 3"

Problem 4



Input Values		
Discount rate		8%
Development cost		$1,000
Probability of technical success		0.8
Launch cost		$300
Probability of commercial success		0.4
Payoff at successful launch		$6,000
Launch Phase		
EV at Year 5	(0.4)$6,000 + 0.6($0) =	$2,400
Expected PV at Year 4	$2,400/(1+0.08)^1 =	$2,222
Less launch cost		-$300
Expected NPV at Year 4	$2,222 - $300	$1,922
Development Phase		
EV at Year 4	0.8($1,922) + 0.2($0) =	$1,538
Expected PV at Year 0	$1,538/(1+0.08)^4 =	$1,130
Less development cost		-$1,000
Expected NPV at Year 0	$1,130 - $1,000 =	$130

Note: All $ values are in millions.

Chapter 3

Problem 1

6%*(0.71) + 9%*(0.14) + 12%*(0.14) = 7.2%

Problem 2

The available investment of $150 million can be allocated to projects No. 1, 6, 5, and 2 which give the highest returns in the portfolio leaving virtually no investment for the remaining projects. The opportunity cost in this portfolio is 18% which corresponds to the return expected from project No.2.

Problem 3

Technology development cost: Private risk
Product launch cost: Private risk
Annual revenues: Market risk
Annual cost of production: Private and market risks

Chapter 4

Problem 1

Projects No. 2, 6, and 7

Chapter 5

Problem 1A

Input Values	
Current value of underlying asset	$300 million
Cost of investment	$300 million
Risk-free rate of return	0.05 per cent
Time to expiration	5.00 years
Volatility of underlying asset	0.30 per cent
Calculated Values	
d1	0.708
d2	0.037
Value of the call option (Calculated using Black-Scholes Equation)	$108 million

Problem 1B

Please see the next page for the binomial solution.

Problem 1C

Please see the spreadsheet titled: Chapter 5 Problem 1C

Chapter 6

Problem 1

- Continued on the next page.

Date	Cash Flow S_t	Return R_t*	ln R_t	Deviation ln R_t - Average ln R	Square of Deviation (ln R_t - Average ln R)^2
12/31/2004	243	1.105	0.099	0.019	0.000
9/31/04	220	1.215	0.195	0.114	0.013
6/31/04	181	0.995	-0.006	-0.086	0.007
3/31/2004	182	1.034	0.034	-0.047	0.002
12/31/2003	176	1.086	0.083	0.002	0.000
9/31/2003	162	1.087	0.084	0.003	0.000
6/31/2003	149	0.980	-0.020	-0.101	0.010
3/31/2003	152	1.056	0.054	-0.027	0.001
12/31/2002	144	1.091	0.087	0.006	0.000
9/31/2002	132	1.056	0.054	-0.026	0.001
6/31/2002	125	1.250	0.223	0.142	0.020
3/31/2002	100	-	-	-	-
Average ln R:			0.081		
Total of squares of deviaiton:					0.055

*$R_t = S_t/S_{t-1}$

Volatility factor is: Square root of (Total of squares of deviaiton/n-1),
where n is the number of values included
= Square root [0.055/(11-1)]
= 0.074

Problem 2

7.4%*√(1/0.25) = 14.8%

Problem 3

Please see the spreadsheet titled: Chapter 6 Problem 3

Problem 4

[ln(300/55)]/(4*√5) = 19%