FIN 6100 Fall 2017 Exam 2 Name Answer Key

NOTE: Type your name in cell G1

Multiple Choice

1	**A**	0
2	**B**	0
3	**C**	0
4	**D**	0
5	**E**	0
6	**C**	0
7	**D**	0
8	**A**	0
9	**E**	0
10	**A**	0

Total missed 0

Points off 0

Answer Key

Problem #1 (11 points)

A project under consideration will produce cash flows of $630,000 per year for 13 years. The project will cost $3.8 million today to begin production. In one year, it is possible that the project will be a runaway success. If this is true, the company can spend $1.8 million at that time to expand production. After expansion, the annual cash flows would be $1.35 million per year. There is a 30 percent likelihood of a runaway success. In either case, the project will still end 13 years from today. What is the value of the option to expand assuming a required return of 12 percent? What is the minimum new cash flow that the company would require to undertake the expansion?

Annual cash flow	$	630,000
Project life		13
Initial cost	$	3,800,000
Secondary investment	$	1,800,000
Annual cash flow if success	$	1,350,000
Probability of success		30%
Required return		12%

Original NPV	$	246,835.50
NPV in Year 1 of expansion	$	6,562,405.20
Value today of expansion	$	5,859,290.36
Value Year 1 of not expanding	$	3,902,455.76
Value today of not expanding	$	3,484,335.50
NPV with expansion	$	959,321.96
Value of option to expand	**$**	**712,486.46**
Cash flow needed for zero NPV of expansion cost	$	290,586.25
Minimum cash flow	**$**	**920,586.25**

Easy solution:

The NPV of expanding in one year	$	2,659,949.44
NPV of expanding today	$	2,374,954.86
NPV of expanding times probability of expanding	**$**	**712,486.46**

Answer Key

Problem #2 (10 points)

Hawley Corp. had sales of $95 million for the current year. Costs were $57 million, and net investment was $12 million. Each of these is expected to grow at 13 percent next year, with the growth rate declining by 2 percent per year until the growth rate reaches 5 percent. There are 7.75 million shares of stock outstanding and investors require a return of 11 percent return on the company's stock. To estimate the terminal value, you feel that the PE ratio is most appropriate and the correct PE multiple is 14. The corporate tax rate is 35 percent. What is your estimate of the company's stock price?

Current sales	$	95,000,000				
Costs	$	57,000,000				
Net investment	$	12,000,000				
		Year 1	Year 2	Year 3	Year 4	Year 5
		13.00%	11.00%	9.00%	7.00%	5.00%
Shares outstanding		7,750,000				
Required return		11%				
Tax rate		35%				
Terminal PE ratio		14				

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Sales	$ 107,350,000	$ 119,158,500	$ 129,882,765	$ 138,974,559	$ 145,923,286
Costs	64,410,000	71,495,100	77,929,659	83,384,735	87,553,972
Pretax profit	$ 42,940,000	$ 47,663,400	$ 51,953,106	$ 55,589,823	$ 58,369,315
Taxes	15,029,000	16,682,190	18,183,587	19,456,438	20,429,260
Net income	$ 27,911,000	$ 30,981,210	$ 33,769,519	$ 36,133,385	$ 37,940,054
Net investment	13,560,000	15,051,600	16,406,244	17,554,681	18,432,415
Cash flow	$ 14,351,000	$ 15,929,610	$ 17,363,275	$ 18,578,704	$ 19,507,639

Year 5 teminal value	$	531,160,763
		Cash flow
Year 1	$	14,351,000
Year 2	$	15,929,610
Year 3	$	17,363,275
Year 4	$	18,578,704
Year 5	$	550,668,402
Value of company today	$	377,586,797
Price per share	**$**	**48.72**

Answer Key

Problem #3 (10 points)

Muscle Motors has a new sports car called the SmoMobile® that it is evaluating before bringing to market. The new car, which is customized for the buyer, would be sold for the next five years at a price of $95,000 each. The equipment necessary for production will cost $165 million and be depreciated on a 5-year MACRS schedule. The company projects that fixed costs will be $53.9 million per year and variable costs will be $49,600 per car. The company will require an investment in inventory equal to 10 percent of sales a year prior to the sale. The inventory will be returned at the end of the project's life. The equipment can be sold for $20 million at the end of the project, although the company will retain the equipment for a future model. The required return is 12 percent and the tax rate is 38 percent. How many cars must be sold each year to make this investment attractive to the company?

Price per unit	$	95,000				
Equipment	$	165,000,000				
		Year 1	Year 2	Year 3	Year 4	Year 5
Depreciation		20.00%	32.00%	19.20%	11.52%	11.52%
Fixed costs	$	53,900,000				
Variable costs	$	49,600				
Inventory		10%				
Equipment salvage	$	20,000,000				
Required return		12%				
Tax rate		38%				

Units sold		**2,382.24**				
Equipment book value			$ 132,000,000	$ 79,200,000	$ 47,520,000	$ 28,512,000	$ 9,504,000
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales			$ 226,313,257	$ 226,313,257	$ 226,313,257	$ 226,313,257	$ 226,313,257
VC			118,159,343	118,159,343	118,159,343	118,159,343	118,159,343
Fixed costs			53,900,000	53,900,000	53,900,000	53,900,000	53,900,000
Depreciation			33,000,000	52,800,000	31,680,000	19,008,000	19,008,000
EBT			$ 21,253,914	$ 1,453,914	$ 22,573,914	$ 35,245,914	$ 35,245,914
Tax			8,076,487	552,487	8,578,087	13,393,447	13,393,447
NI			$ 13,177,427	$ 901,427	$ 13,995,827	$ 21,852,467	$ 21,852,467
+Depreciation			33,000,000	52,800,000	31,680,000	19,008,000	19,008,000
OCF			$ 46,177,427	$ 53,701,427	$ 45,675,827	$ 40,860,467	$ 40,860,467
Capital spending	$	(165,000,000)					16,011,520
NWC		(22,631,326)					22,631,326
Total cash flow	$	(187,631,326)	$ 46,177,427	$ 53,701,427	$ 45,675,827	$ 40,860,467	$ 79,503,313

Aftertax salvage		
Sell equipment	$	20,000,000
Taxes		(3,988,480.00)
Total aftertax salvage	$	16,011,520

NPV	$0.00

Microsoft Excel 15.0 Answer Report
Worksheet: [FIN 6100 Exam 2 Fall 2017 with answers.xlsx]#3
Report Created: 10/27/2017 1:27:01 PM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine

Engine: GRG Nonlinear
Solution Time: 0.015 Seconds.
Iterations: 1 Subproblems: 0

Solver Options

Max Time 100 sec, Iterations 100, Precision 0.000001
Convergence 0.0001, Population Size 100, Random Seed 0, Derivatives Forward, Require Bounds
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 5%, Solve Without Integer Constra

Objective Cell (Value Of)

Cell	Name	Original Value	Final Value
B39	NPV Year 0	$11,464,385.74	$0.00

Variable Cells

Cell	Name	Original Value	Final Value	Integer
B16	Units sold Year 1	2,500	2,382	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
B39	NPV Year 0	$0.00	B39=0	Binding	0

Answer Key

Problem #4 (14 points)

Hörnqvist Industries is considering the production of hockey skates. The new skates would have a price of $159 today. The equipment necessary for production will cost $18.5 million and will be depreciated on a 10-year MACRS schedule. The projected sales are 40,000, 48,000, 53,000, 60,000, and 65,000 pairs per year for the next five years, respectively. Variable costs will be $35 per pair and fixed costs are estimated at $2.5 million per year, both in today's dollars. The company expects that the project will continue indefinitely and the cash flow will increase at a .5 percent real rate. The company has a tax rate of 38 percent and a nominal required return of 11 percent on new product lines. What is the NPV of the new skates?

Price per unit	$	159				
Machine cost	$	18,500,000				
		Year 1	Year 2	Year 3	Year 4	Year 5
Depreciation		10.00%	18.00%	14.40%	11.52%	9.22%
Units sold		40,000	48,000	53,000	60,000	65,000
Variable cost/unit	$	35				
Fixed costs	$	2,500,000				
Real perpetual CF growth rate		0.5%				
Inflation rate		3.3%				
Nominal required return		11%				
Tax rate		38%				

NOMINAL CASH FLOWS

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Nominal price		$ 164.25	$ 169.67	$ 175.27	$ 181.05	$ 187.02
Variable cost/boat		$ 36.16	$ 37.35	$ 38.58	$ 39.85	$ 41.17
Fixed costs		$ 2,582,500	$ 2,667,723	$ 2,755,757	$ 2,846,697	$ 2,940,638
Sales		$ 6,569,880	$ 8,144,023	$ 9,289,107	$ 10,862,997	$ 12,156,599
VC		1,446,200	1,792,710	2,044,772	2,391,226	2,675,981
FC		2,582,500	2,667,723	2,755,757	2,846,697	2,940,638
Dep		1,850,000	3,330,000	2,664,000	2,131,200	1,705,700
EBT		$ 691,180	$ 353,591	$ 1,824,578	$ 3,493,874	$ 4,834,280
Tax		262,648	134,365	693,339	1,327,672	1,837,026
NI		$ 428,532	$ 219,227	$ 1,131,238	$ 2,166,202	$ 2,997,253
+Dep		1,850,000	3,330,000	2,664,000	2,131,200	1,705,700
OCF		$ 2,278,532	$ 3,549,227	$ 3,795,238	$ 4,297,402	$ 4,702,953
Capital spending	$ (18,500,000)					
Terminal value						67,967,448
Total cash flow	$ (18,500,000)	$ 2,278,532	$ 3,549,227	$ 3,795,238	$ 4,297,402	$ 72,670,401

NPV **$35,165,586.32**

Nominal CF growth rate	3.816%
Year 6 nominal CF	$4,882,441.62
Year 5 terminal value	$67,967,447.91

REAL CASH FLOWS

Real required return 7.454%

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Sales		$ 6,360,000	$ 7,632,000	$ 8,427,000	$ 9,540,000	$ 10,335,000
VC		1,400,000	1,680,000	1,855,000	2,100,000	2,275,000
FC		2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Dep		1,790,900	3,120,639	2,416,759	1,871,643	1,450,110
EBT		$ 669,100	$ 331,361	$ 1,655,241	$ 3,068,357	$ 4,109,890
Tax		254,258	125,917	628,992	1,165,976	1,561,758
NI		$ 414,842	$ 205,444	$ 1,026,250	$ 1,902,382	$ 2,548,132
+Dep		1,790,900	3,120,639	2,416,759	1,871,643	1,450,110
OCF		$ 2,205,742	$ 3,326,083	$ 3,443,008	$ 3,774,024	$ 3,998,242
Capital spending	$ (18,500,000)					
Terminal value						57,782,903
Total cash flow	$ (18,500,000)	$ 2,205,742	$ 3,326,083	$ 3,443,008	$ 3,774,024	$ 61,781,145

NPV **$35,165,586.32**

Year 6 real cash flow $ 4,018,233.13

Year 5 terminal value $ 57,782,902.80

Answer Key

Problem #5 (25 points)

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Sales	$ 1,300,000	$ 1,600,000	$ 1,900,000	$ 2,200,000	$ 2,400,000
Variable costs	34%				
License fee	6%				
Equipment	$ 3,750,000				
MACRS depreciation	5.00%	9.50%	8.55%	7.70%	6.93%
Net working capital	15%				
Fixed costs	$ 275,000				
Consultant fee	$ 75,000				
Lost sales	$ 110,000	$ 120,000	$ 130,000	$ 130,000	$ 140,000
Existing products variable cost	32%				
Existing products fixed costs	$ 325,000				
Perpetual growth rate	2.2%				
Weight of debt	25%				
Weight of equity	75%				
Debt floatation cost	3%				
Equity floatation cost	6%				
Internal equity percentage	80%				
Cost of option	$ 150,000				
Lost sales if not exercised	$ -	$ -	$ 110,000	$ 125,000	$ 140,000
Tax rate	38%				
Cost of capital	10.1%				

Weighted average floatation 1.65%

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Sales						
New line		$ 1,300,000	$ 1,600,000	$ 1,900,000	$ 2,200,000	$ 2,400,000
Lost sales		(110,000)	(120,000)	(130,000)	(130,000)	(140,000)
Lost sales if not licensed		-	-	110,000	125,000	140,000
Net sales		$ 1,190,000	$ 1,480,000	$ 1,880,000	$ 2,195,000	$ 2,400,000
Variable costs						
New line		$ 442,000	$ 544,000	$ 646,000	$ 748,000	$ 816,000
Lost sales		(35,200)	(38,400)	(41,600)	(41,600)	(44,800)
Lost sales if not licensed		-	-	35,200	40,000	44,800
		$ 406,800	$ 505,600	$ 639,600	$ 746,400	$ 816,000
Sales		$ 1,190,000	$ 1,480,000	$ 1,880,000	$ 2,195,000	$ 2,400,000
Variable costs		406,800	505,600	639,600	746,400	816,000
Licensing fee		78,000	96,000	114,000	132,000	144,000
Fixed costs		275,000	275,000	275,000	275,000	275,000
Depreciation		187,500	356,250	320,625	288,750	259,875
EBT		$ 242,700	$ 247,150	$ 530,775	$ 752,850	$ 905,125
Tax		92,226	93,917	201,695	286,083	343,948
NI		$ 150,474	$ 153,233	$ 329,081	$ 466,767	$ 561,178
+Depreciation		187,500	356,250	320,625	288,750	259,875
OCF		$ 337,974	$ 509,483	$ 649,706	$ 755,517	$ 821,053
Capital spending	$ (3,750,000)					
Floatation costs	(62,913)					
NWC spending		(178,500)	(222,000)	(282,000)	(329,250)	(360,000)
NWC recovered		-	178,500	222,000	282,000	329,250
Total cash flow	$ (3,812,913)	$ 159,474	$ 465,983	$ 589,706	$ 708,267	$ 790,303

Year 6 cash flow	$ 807,689
Value in Year 5 of future CFs	$ 10,223,913.35

		Cumulative cash flows after Year 5	$ (1,099,181)
Cash Flows	t	Year 6	$ 807,689 $ (291,492)
	0 $ (3,812,913)	Year 7	$ 825,458 $ 533,966
	1 159,474		
	2 465,983		
	3 589,706		
	4 708,267		
	5 11,014,216		

Payback period	**7.353**
Profitability index	**2.167**

NPV	**$ 4,448,151.29**
IRR	**17.83%**

Microsoft Excel 15.0 Answer Report
Worksheet: [FIN 6100 Exam 2 Fall 2017 with answers.xlsx]#5
Report Created: 10/20/2017 2:34:07 PM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine
Engine: GRG Nonlinear
Solution Time: 0.046 Seconds.
Iterations: 4 Subproblems: 0
Solver Options
Max Time 100 sec, Iterations 100, Precision 0.000001
Convergence 0.0001, Population Size 100, Random Seed 0, Derivatives Forward, Require Bounds
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 5%, Solve Without Integer Constraints

Objective Cell (Value Of)

Cell	Name	Original Value	Final Value
B72	NPV t	$ 4,440,459.58	$ -

Variable Cells

Cell	Name	Original Value	Final Value	Integer
B23	Cost of capital Year 1	10.1%	17.8%	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
B72	NPV t	$ -	B72=0	Binding	0