ELEC 481

Assignment 6

Submitted to Prof. Jeff Carmichael

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Problem 1 (9-9) (See the spreadsheet)

According to Excel formulas:

	A	B	C	D
IRR	13.15%	10.31%	16.56%	8.77%

Thus, projects A and C can be funded by the $100,000 capital budget.
The opportunity cost, the best option upon the ones not selected, would be IRR of B, which is 10.31%.

Problem 2 (9-13)

As the factory is doing new investments, the interest rate of evaluating the project is 16%. Thus, project B with IRR of 10.31% should not be approved. Normally, according to the given risk-adjusted interest rates in manufacturing, only when the factory is willing to take the risk that's not greater than having new products in normal market will B be funded.

Problem 3 (9-16) (See the spreadsheet)

a)

Projects A, B, C, E, F, G, H, I, J should be approved if the committee's budget is enough.

b)

Project	discounted sum of costs	discounted sum of benefits	NPW/PW of cost	NPW at 13%	IRR
A	$10,000	$10,481	0.05	$481	15%
B	$15,000	$19,626	0.31	$4,626	25%
C	$5,000	$5,381	0.08	$381	16%
E	$15,000	$15,370	0.02	$370	14%
F	$30,000	$34,504	0.15	$4,504	19%
G	$25,000	$27,470	0.10	$2,470	17%
H	$10,000	$12,275	0.23	$2,275	22%
I	$5,000	$5,874	0.17	$874	20%
J	$10,000	$11,255	0.13	$1,255	18%

c)

Since present worth index is a better measure only when PW is applied at the correct interest rate, we rank the projects according to IRR.
Most desired to the least: B, H, I, F, J, G, C, A, E

d)

According to C, project B, H, I, F, J should be approved with $85,000 available.

Problem 4 (10-5)

a)

Build the road in 12 years:
PW of cost = $5,000,000 (P/F, 5.5%, 12) = $2,629,907.59

Build the road in 7 years:
PW of cost = $5,000,000 (P/F, 5.5%, 7) = $3,437,184.04

Build the road in 4 years:
PW of cost = $5,000,000 (P/F, 5.5%, 4) = $4,036,083.72

b)

The expected value = 0.35*$2,629,907.59 + 0.40*$3,437,184.04 + 0.25*$4,036,083.72 = $3,304,362

Problem 5 (10-8)

a)

# of sales	probability	unit profit	total
10000	65%	$22	$220,000
13000	20%	$18	$234,000
7500	15%	$25	$187,500

b)

Expected value = 0.65*$220,000 + 0.2*$234,000 + 0.15*$187,500 = $217,925

Problem 6 (10-13) (See the spreadsheet)

a) b)

Savings per Year	Probability	Useful Life (yrs)	Probability	Joint Probability	NPW
$18,000	25%	3	0.650	0.16	-$37,762
$30,000	55%	3	0.650	0.36	-$6,271
$42,000	20%	3	0.650	0.13	$25,221
18,000	25%	5	0.350	0.09	-$11,196
30,000	55%	5	0.350	0.19	$38,006
42,000	20%	5	0.350	0.07	$87,208

c)

The optimistic scenario would be a saving of $42,000 per year for 5 years (P=0.07, NPW = $87,208).
The most likely scenario would be a saving of $30,000 per year for 3 years (P=0.07, NPW = -$6,271).
The pessimistic scenario would be a saving of $18,000 per year for 2 years (P=0.07, NPW = -$37,762).

Problem 7 (10-30)

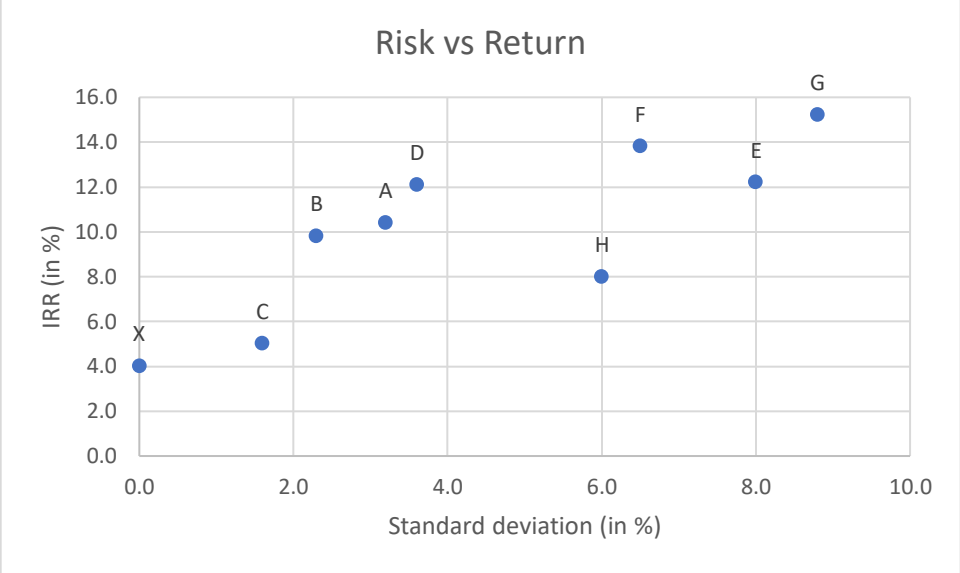
At D2,
A1: 0.4*12000 + 0.6*8100 = 9660
A2: 10000

At D1,
A: 0.4*9660 + 0.6*4000 = 6264
B: 0.4*9000 + 0.6*5000 = 6600

Thus, at D1, B should be selected since it has a greater expected value. At D2, A2 should be selected.

Problem 8 (10-45) (See the spreadsheet)

a)



b)

Products C, A, H, and E are poor candidates since they can be easily replaced by the combination of other products for a lower risk at the same level of IRR or a higher IRR at the same level of risk.

c)

It depends. If MARR is large, I would probably tend to choose F/G with a high risk and IRR. On the contrary, I would go with X/B to achieve a low risk.

Problem 9 (10-47) (See the spreadsheet)

a)

As suggested, we can first generate 25 sets of numbers for initial capital cost and the life of generator respectively. Then we are able to find out all the NPWs and standard deviation.
The expected value of NPW = $13,401

b)

SD of NPW = $58,487