Solutions Manual

# Module F: Decision-Making Tools

1a. Laplace: Expand $76,666

1b. Maximin: Do Nothing $40,000

1c. Maximax: Expand $160,000

1d. Hurwicz: Expand $84,000

1e. Minimax regret: Subcontract $60,000

Cognitive Domain: Knowledge

Difficulty Level: Easy

2a. EV for Do Nothing: .3 x 40,000 + .4 x 60,000 + .3 x 80,000 = $60,000

EV for Expand: .3 x 30,000 + .4 x 100,000 + .3 x 160.000 = $79,000 \* Optimal

EV for Subcontract: .3 x 10,000 + .4 x 70,000 + .3 x 100,000 = $61,000

2b. Perfect information is worth $21,000 = $100,000 – $79,000

Cognitive Domain: Knowledge

Difficulty Level: Easy

3a. Hurwicz selection: Moderate expansion $70,000 x .4 – $20,000 x .6 = $16,000

Minimax regret selection: Large expansion $60,000

Cognitive Domain: Knowledge

Difficulty Level: Easy

4a. Do nothing—$12,000, Moderate expansion—$37,000, Large expansion—$49,000, New facility—$73,000. Choose New facility.

4b. The expected value of perfect information is $20,000 = $93,000 – $73,000.

Cognitive Domain: Knowledge

Difficulty Level: Easy

5a.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Order Quantity* | | | | |  |
| *Demand* | *80* | *90* | *100* | *110* | *120* | *Probability* |
| 80 | $3,200 | $2,650 | $2,100 | $1,550 | $1,000 | 0.10 |
| 90 | $3,200 | $3,600 | $3,050 | $2,500 | $1,950 | 0.20 |
| 100 | $3,200 | $3,600 | $4,000 | $3,450 | $2,900 | 0.25 |
| 110 | $3,200 | $3,600 | $4,000 | $4,400 | $3,850 | 0.30 |
| 120 | $3,200 | $3,600 | $4,000 | $4,400 | $4,800 | 0.15 |

Each sold book results in $40 profit; each ordered, but unsold book results in a loss of $55.

5b. The maximum expected value is $3,620 for an order quantity of 100.

Cognitive Domain: Analysis

Difficulty Level: Medium

6a. Laplace: Greece $15.8

6b. Maximin: Greece $18

6c. Maximax: Greece $14

6d. Hurwicz: Greece $16.4

6e. Minimax regret: Greece $0

Cognitive Domain: Analysis

Difficulty Level: Medium

7a. Laplace: Chennai $24.33

7b. Maximin: Chittagong -$17

7c. Maximax: Chennai $75

7d. Hurwicz: Manila $1.9

7e. Minimax regret: Manila $15

Cognitive Domain: Knowledge

Difficulty Level: Easy

8a. EV for Chennai: $33.1 (best)

EV for Chittagong: $21.8

EV for Manila: $28.5

EV for Shanghai: $29.2

EV for Jakarta: $25.9

8b. The expected value of perfect information is $7.3 = $40.4 – $33.1

Cognitive Domain: Knowledge

Difficulty Level: Easy

9a. Laplace: Stocks $333.33

9b. Maximin: Money market $50

9c. Maximax: Stocks $800

9d. Hurwicz: Money market $80

9e. Minimax regret: Hedge fund $270

Cognitive Domain: Knowledge

Difficulty Level: Easy

10a. Using probabilities of .3 for Stable, .5 for Favorable, and .2 for Unfavorable:

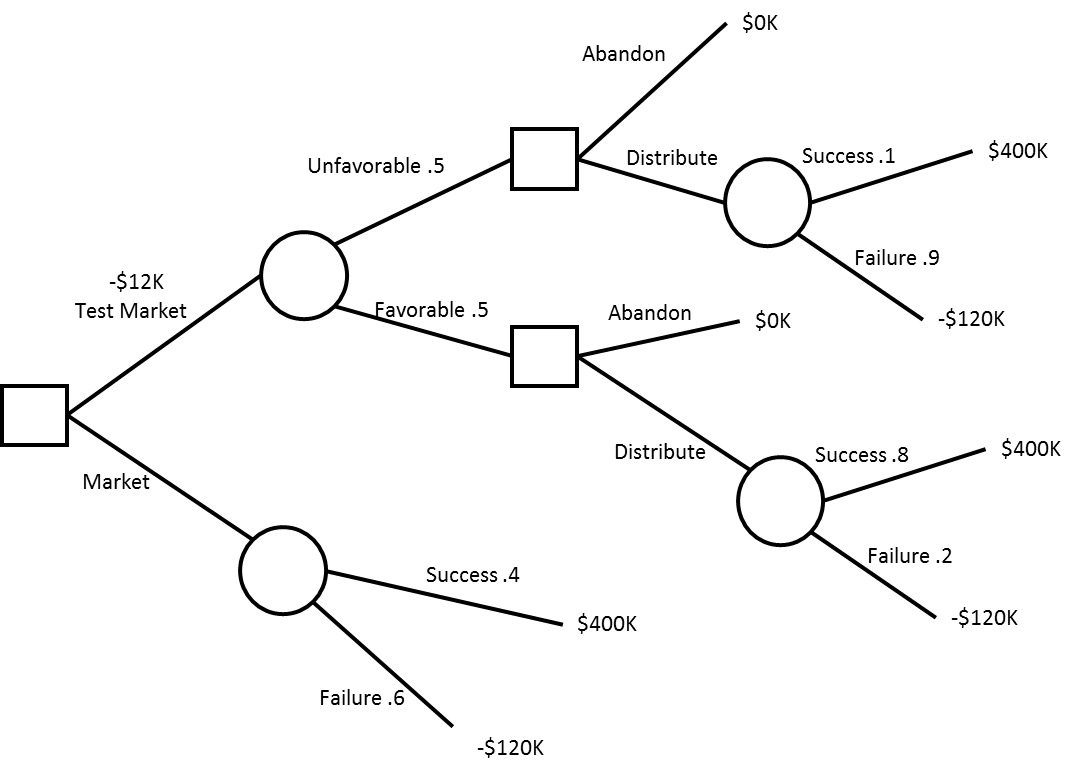
Stocks $490 (best); Bonds $224; Money market $118; Real estate $306; Hedge fund $407

10b. The expected value of perfect information is $70 = $560 – $490.

Cognitive Domain: Knowledge

Difficulty Level: Easy

11.



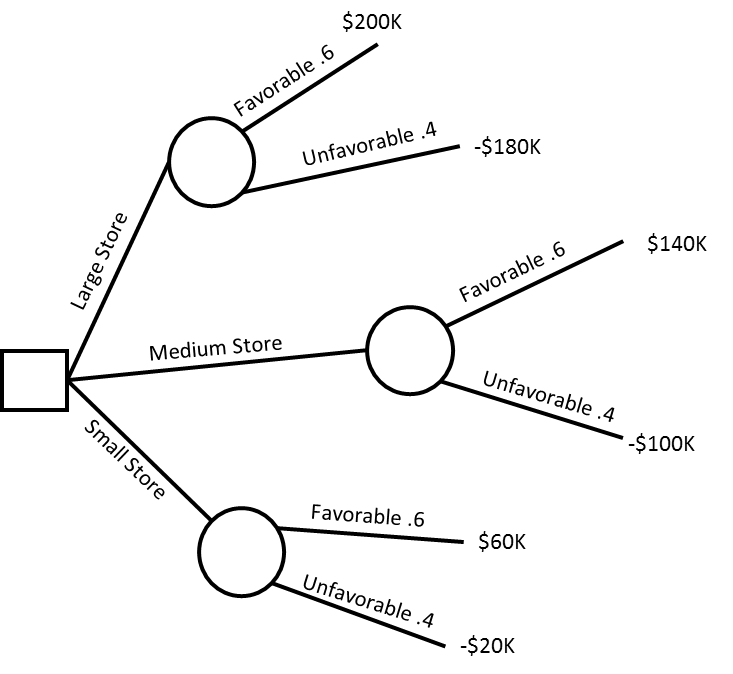
Going directly to market has a value of .4 x $400 + .6 x -$120 = $88.

The test market branch has a value of .8 x 400 + .2 x 120 = $148 to distribute after a favorable test and a value of $0 to distribute after an unfavorable test. Weighting these as 0.5 each yields a value of $74, less an initial outlay of $12, for an initial value of $62 to go to a test market. Thus, going directly to market is the best choice at an expected value of $88,000.

Cognitive Domain: Analysis

Difficulty Level: Medium

12a. Ozgun should build a large store for an expected payoff of $48,000.



12b. Large store: Y=-380,000X+200,000

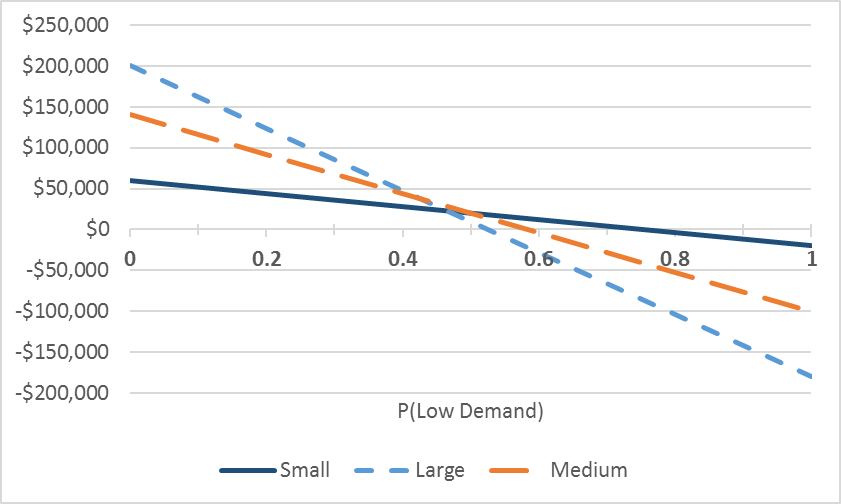
Medium store: Y=-240,000X+140,000

Small store: Y=-80,000X+60,000

Small and Medium intersection: -80,000X+60,000=-240,000X+140,000; X=.5

Large and Medium intersection: -380,000X+200,000=-240,000X+140,000; X=0.42

From P(low demand) = 0 to 0.42, choose Large; from P(low demand) = 0.42 to 0.5 choose Medium; and for P(low demand) above 0.5, choose Small.

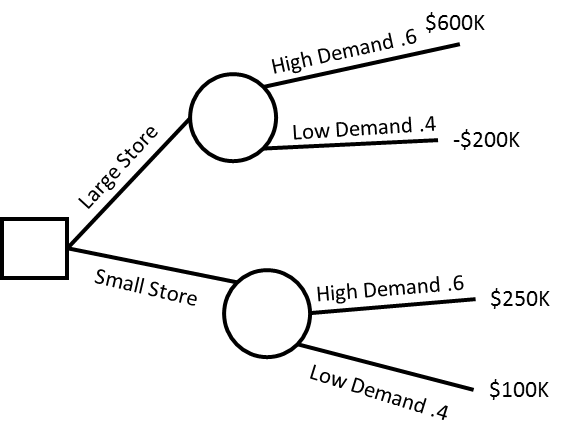


12c. The expected value of perfect information is $64,000 = $112,000 – $48,000

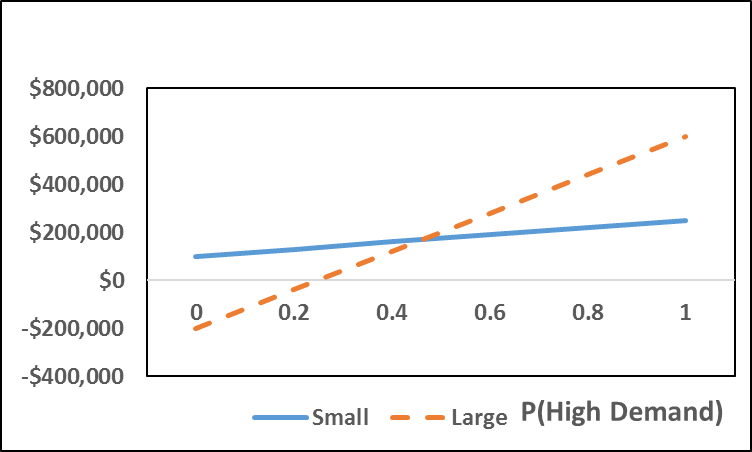
Cognitive Domain: Analysis

Difficulty Level: Hard

13a. The optimal choice is build large, which has an expected value of $280,000.



13b.



Small demand = 150,000X + 100,000; Large demand = 800,000X – 200,000

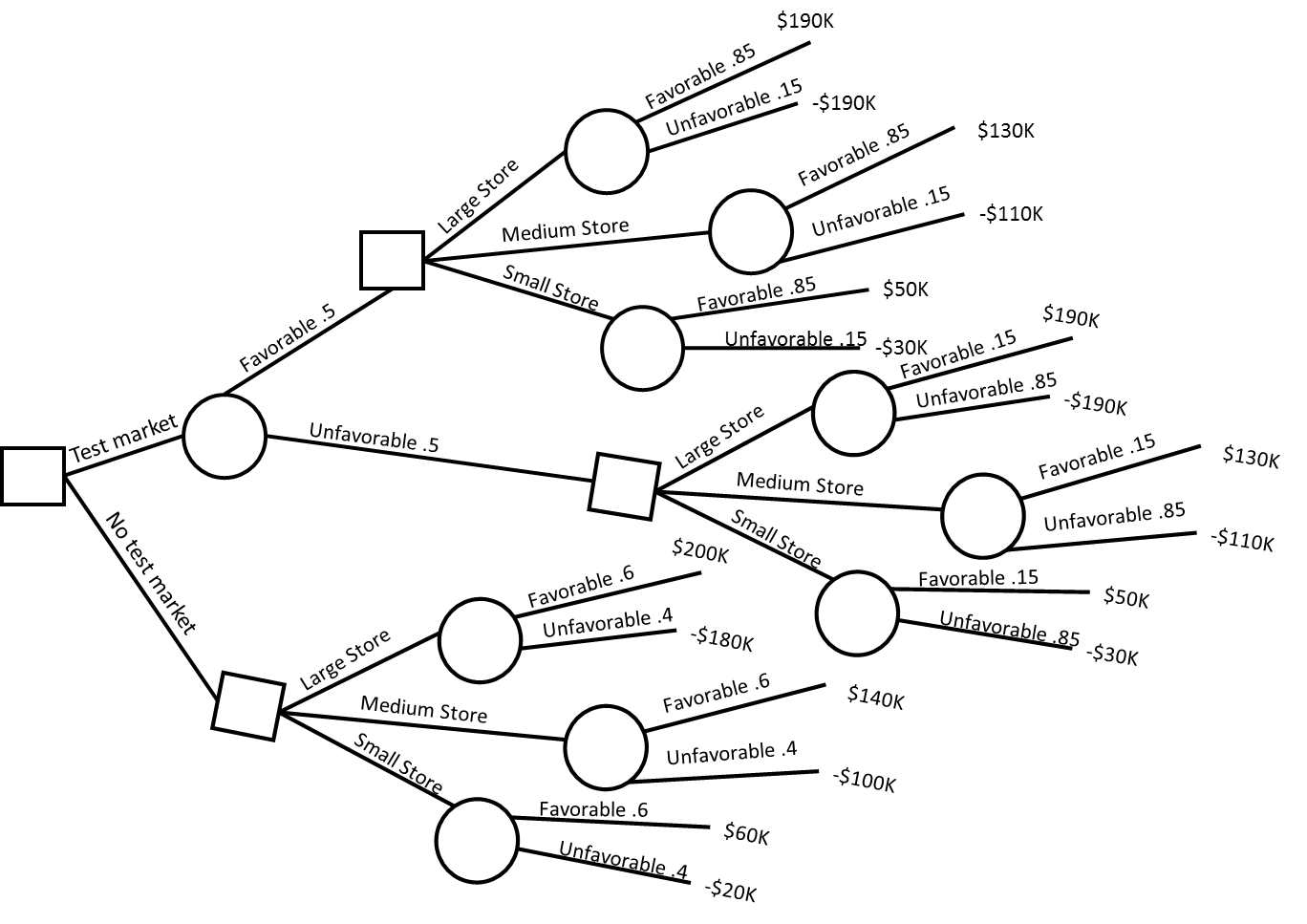
Intersection point is 0.46. From P(High demand) = 0 to 0.42, build Small, and from P(High demand) 0.42 to 1, build Large.

13c. EVPI = $120,000 = $400,000 – $280,000

Cognitive Domain: Analysis

Difficulty Level: Hard

14a.



14b. No test market branch: Large = .6 x200-.4x180 = $48K; Medium = .6x140-.4x100 = $44K; Small = .6x60-.4x20 = $28K🡪build Large $48,000

Test market favorable branch: Large = .85x190-.15x-190 = $133K; Medium = .85x130-.15x-110 = $94K; Small = .85x50-.15x30 = $38K🡪build Large $133,000

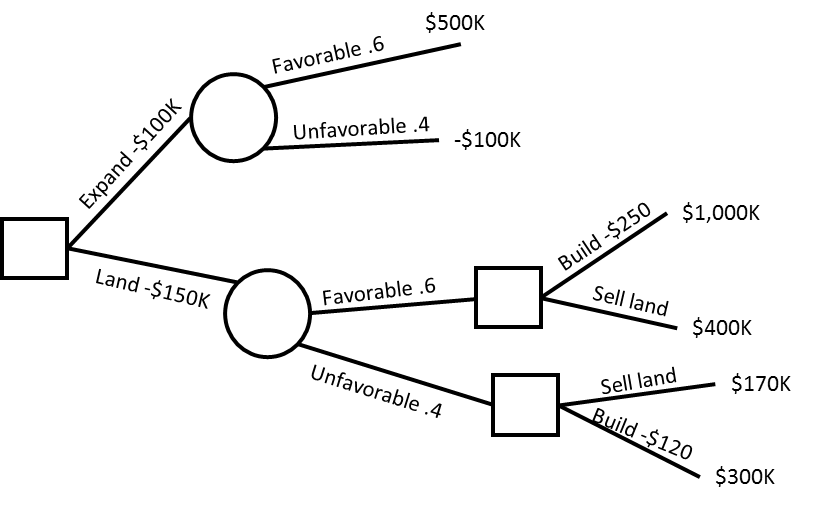
Test market unfavorable branch: Large = .15x190-.85x-110 = -$133K; Medium = .15x130-.85x-110 = -$74K; Small =.15x50-.85x30 = -$18K🡪build Small -$18,000

Test market branch: 0.5x133-0.5x18 = $57,500

Choose test market since $57,500 > $48,000.

Cognitive Domain: Analysis

Difficulty Level: Hard



15.

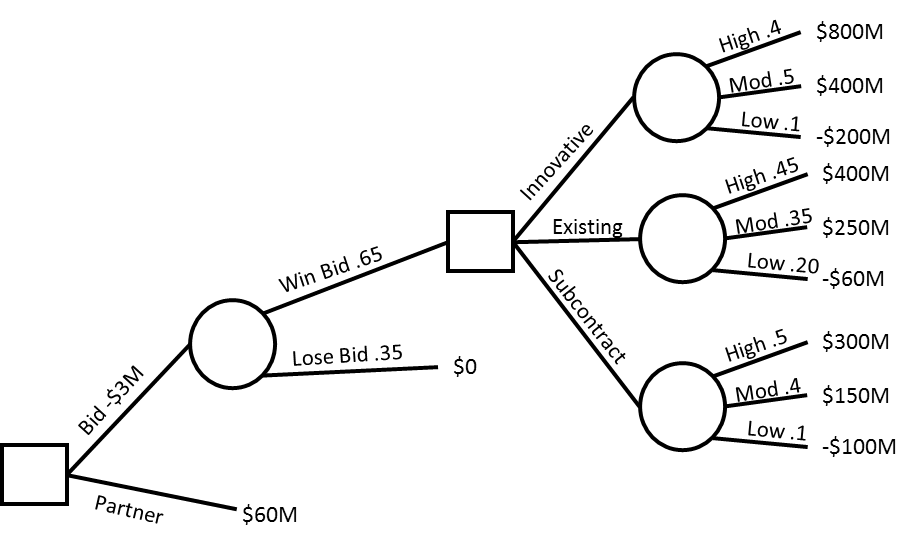
Expand branch: .6 x 500 – .4 x 100 – 100 = $160,000

Land branch: .6 x 750 + .4 x 180 – 150 = $372,000

Sanjay should buy land.

Cognitive Domain: Analysis

Difficulty Level: Medium

16.

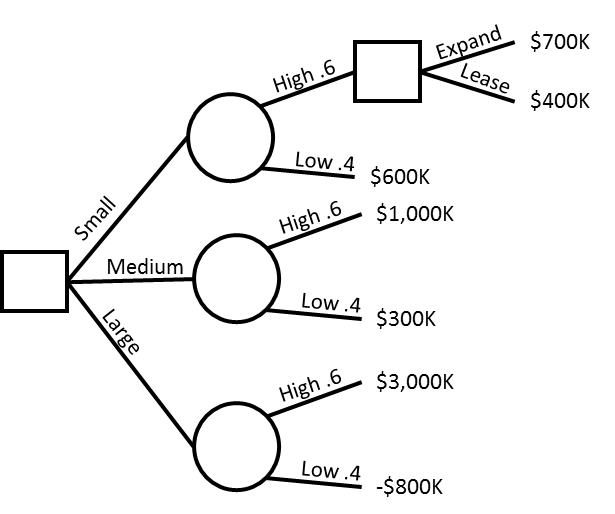
Innovative branch = $500M, Existing branch = $255.5M, Subcontract branch = $200M; choose Innovative.

Bid branch: .65 x 500M + .35 x 0 – 3,000 = $322,000,000; Partner branch: $60,000,000; choose to bid.

Cognitive Domain: Analysis

Difficulty Level: Medium

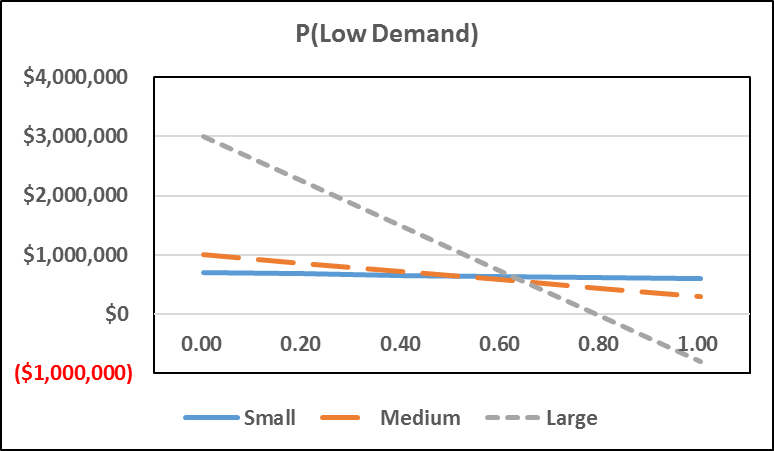
17.



Large branch = .6 x 3,000 – .4 x 800 = $1,480,000; Medium branch = .6 x 1,000 + .4 x 300 = $720,000; Small branch = .6 x 700 + .4 x 600 = $660,000. Choose Large.

Cognitive Domain: Analysis

Difficulty Level: Medium

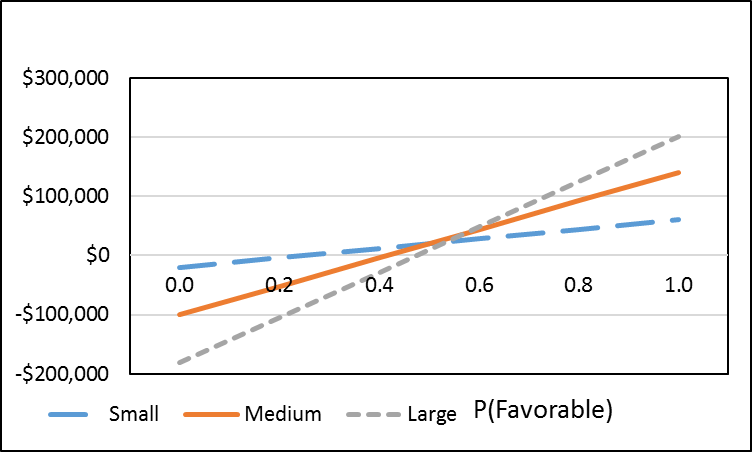
18a.

18b. Small line is -$100,000X + $700,000. It rises above the Large line (3,000,000-3,800,000X) at 0.62. From P(low demand) greater than 0.62, it is best to build Small.

18c. Building Medium is never the best alternative—its profit line is always below either Large or Small.

Cognitive Domain: Analysis

Difficulty Level: Hard

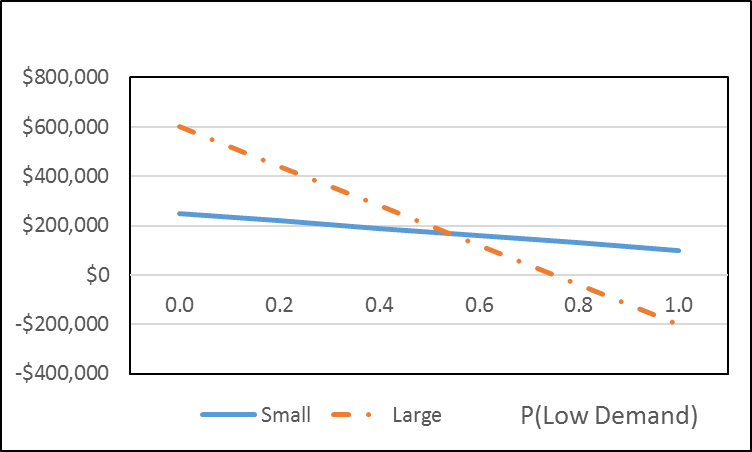
19.

Small and Medium lines cross at 80,000X-20,000 = 240,000X-100,000 🡪X = 0.5; if P(Favorable Market) is 0.5 or less, build Small. Medium and Large lines cross at 240,000X-100,000 = 380,000X-180,000 🡪X = .5714. If P(Favorable) exceeds 0.5714, build Large. Between P(Favorable) = 0.5 and 0.57, build Medium.

Cognitive Domain: Analysis

Difficulty Level: Hard

20.



The lines cross where Large 600,000-800,000X = 250,000-150,000X Small X = 0.53846

For P(Low Demand) less than 0.538, build Large and above that likelihood, build Small.

Cognitive Domain: Analysis

Difficulty Level: Hard

21a. Laplace: Jasmine $82.5

21b. Maximin: Lavender $50

21c. Maximax: Jasmine $150

21d. Hurwicz: Lavender $86

21e. Minimax regret: Sandalwood $30

Cognitive Domain: Knowledge

Difficulty Level: Easy

22a. Jasmine will earn the highest profits of $105,000.

22b. The expected value of perfect information is $9,000, which is the most Capt. Muralidharan should be willing to pay a consultant in order to make a more informed decision about the level of demand in the future.

Cognitive Domain: Knowledge

Difficulty Level: Easy

23. From the top down, the expected values at the nodes labeled *#2* are 64, 81.5, 136, 27, 111, and 36.

The Ultra Lite value is .2 x 64 + .5 x 81.5 + .3 x 136 = $94.35; the Feather Lite value is .2 x 27 + .5 x 111 + .3 x 36 = $71.7. Patagonia’s Ultra Lite has the highest expected value.

Cognitive Domain: Knowledge

Difficulty Level: Easy

24a. Laplace: Child care center $33

24b. Maximin: Child care center $22

24c. Maximax: Swimming pool $100

24d. Hurwicz: Running track $37

24e. Minimax regret: Running track $45

Cognitive Domain: Knowledge

Difficulty Level: Easy

25a. The Swimming Pool at $47,000 has the highest expected monetary value.

25b. The perfect information decision for Low demand is Running Track at 10,000 x .25 = 2,500. The perfect information decision for Moderate demand is Child-care Center at 0.5 x $32,000 = $16,000. The perfect information decision for High demand is Swimming Pool at 0.5 x $100,000 = $50,000. The total is $68,500, but the likelihoods sum to 1.25.

Cognitive Domain: Knowledge

Difficulty Level: Easy