Practice problems, section 3-1

1. Create a decision table for this problem. One marble is going to be randomly selected from a jar that contains 35 percent red marbles, 25 percent blue marbles, and 40 percent green marbles. If you bet on red and a red marble is drawn, you get $28. If you bet on blue and a blue marble is drawn, you get $35. And if you bet on green and a green marble is drawn, you get $25. Otherwise, you lose $8 (i.e., you get -$8).

Create a decision table for this problem, and calculate the expected value for each option. Which option should you choose if you are following the expected value strategy?

2. Calculate the expected value for each option. Which option do we choose if we are following the expected value strategy?

	P = .10 red is drawn	P = .60 blue is drawn	P = .30 green is drawn
bet on red	$30	-$12	$3
bet on blue	-$10	$6	$2
bet on green	$3	-$10	$14

3. Smith is applying for a life insurance policy that will cost him $100 a year and pay his family $25,000 if he dies. The insurance company assesses his health and determines that he has a 5 percent chance of dying in the next year. Consider this decision problem from the perspective of the life insurance company, which has the option to offer Smith this policy or not to offer it to him.

Create a decision table, and calculate the expected value of each option. Which option has the higher expected value? Should the life insurance company offer this policy to Smith?

4. Mary is going to invest $10,000 for one year. Her two investment options are (*i*) put the money in a high-interest savings account or (*ii*) put it in a S&P 500 index fund (a mutual fund

that tracks the performance of the stock market). She estimates that there is a 60 percent chance that the index fund will have positive returns and she will make $1,500 (in addition to keeping her $10,000). But there is a 40 percent chance that the index fund (and the stock market) will do very poorly and she will lose $800 (and so end up with $9,200). On the other hand, if she puts the $10,000 in the high-interest savings account, she will make $500 regardless of how the stock market does.

Create a decision table, and calculate the expected value of each option. Which option has the higher expected value? If she is following the expected value strategy, should Mary put her money in the high-interest savings account or in the index fund?

answers

1.

	P = .35 red is drawn	P = .25 blue is drawn	P = .40 green is drawn
bet on red	$28	-$8	-$8
bet on blue	-$8	$35	-$8
bet on green	-$8	-$8	$25

EV(bet on red) = ($28)(.35) + (-$8)(.25) + (-$8)(.40) = 9.80 + (-2.00) + (-3.20) = $4.60

EV(bet on blue) = (-$8)(.35) + ($35)(.25) + (-$8)(.40) = -2.80 + 8.75 + (-3.20) = $2.75

EV(bet on green) = (-$8)(.35) + (-$8)(.25) + ($25)(.40) = -2.80 + (-2.00) + 10.00 = **$5.20**

Following the expected value strategy, we choose bet on green.

2.

EV(bet on red) = ($30)(.10) + (-$12)(.60) + ($3)(.30) = 3.00 + (-7.20) + 0.90 = -$3.30

EV(bet on blue) = (-$10)(.10) + ($6)(.60) + ($2)(.30) = -$1.00 + $3.60 + $0.60 = **$3.20**

EV(bet on green) = ($3)(.10) + (-$10)(.60) + ($14)(.30) = $0.30 + (-$6.00) + $4.20 = -$1.50

Following the expected value strategy, we choose bet on blue.

3.

	P = .05 Smith dies	P = .95 Smith lives
offer Smith the policy	-$25,000	$100
don't offer Smith the policy	$0	$0

EV(offer policy) = (-$25,000)(.05) + ($100)(.95) = -1,250 + 95 = -$1,155

EV(don't offer) = ($0)(.05) + ($0)(.95) = 0 + 0 = **$0**

Not offering Smith the policy has a higher expected value, and so, following the expected value strategy, that's what the company should do.

4.

	P = .60 **stock market grows**	P = .40 **stock market loses value**
savings account	$500	$500
index fund	$1,500	-$800

EV(savings account) = ($500)(.60) + ($500)(.40) = 300 + 200 = $500

EV(index fund) = ($1,500)(.60) + (-$800)(.40) = 900 + (-320) = **$580**

Investing in the index fund has the higher expected value, and so, following the expected value strategy, that's what Mary should do.