SEG 2430 Applied Probability and Statistics
2010 Spring Assignment 2 Solution

3.73 P(bad tires) = 0.2*0.1 + 0.2*0.12 + 0.6*0.04 = 0.068 (5)

3.82 $500 * 1/2000 + $100 * 1/2000 + $0 * 1998/2000 = $0.3 (5)

3.84 Let $x be the required payoff:

$5 * 2/6 = $x * 4/6 => x = $2.5 (5)

3.90 Stocking 0 items:

Expected Revenue = $0; Cost = $0; Expected Profit = $0 (3)

Stocking 1 item:

Expected Revenue = (1-0.05) * 4.5 = $4.275; Cost = $2.1

Expected Profit = $4.275 - $2.1 = $2.175 (9)

Stocking 2 items:

Expected Revenue = 0.15 * 4.5 + (1-0.05-0.15) * 4.5 * 2 = $7.875

Cost = $2.1 * 2 = $4.2

Expected Profit = $7.875 - $4.2 = $3.675 (9)

Stocking 3 items:

Expected Revenue

= 0.15 * 4.5 + 0.3 * 4.5 * 2 + (1-0.05-0.15-0.3) * 4.5 * 3 = $10.125

Cost = $2.1 * 3 = $6.3

Expected Profit = $10.125 - $6.3 = $3.825 (9)

Stocking 4 items:

Expected Revenue

= 0.15 * 4.5 + 0.3 * 4.5 * 2 + 0.25 * 4.5 * 3 + (0.15+0.1) * 4.5 * 4

= $11.25

Cost = $2.1 * 4 = $8.4

Expected Profit = $11.25 - $8.4 = $2.85 (9)

Stocking 5 items:

Expected Revenue

= 0.15*4.5 + 0.3*4.5*2 + 0.25*4.5*3 + 0.15*4.5*4 + 0.1*4.5*5

= $11.7

Cost = $2.1 * 5 = $10.5

Expected Profit = $11.7 - $10.5 = $1.2 (9)

Stocking 3 items maximizes the expected profit. (2)

3.102 (a) Impossible: P(A) + P(B) + P(C) > 1 (4)

(b) Possible: All the axioms of probability are satisfied (3)

(c) Impossible: P(C) < 0 (3)

3.106 We have P(*explodes during lift-off*) = 0.0002

P(*guidance system fails in flight* | *not explode during lift-off*) = 0.0005

The events "explodes during lift-off" and "*guidance system fails in flight*" are **mutually exclusive**.

(a) P(*not explode during lift-off*)

= $P(\overline{\textit{explodes during lift-off}})$

= 1 – 0.0002 = 0.9998 (5)

(b) P(*explodes during lift-off or guidance system fails in flight*)

= P(*explodes during lift-off*) + P(*guidance system fails in flight*)

= P(*explodes during lift-off*)

+ P(*guidance system fails in flight*| *not explode during lift-off*)

× P(*not explode during lift-off*)

= 0.0002 + 0.0005 × 0.9998

= 0.0006999 (15)

(c) P(*neither explodes during lift-off nor guidance system fails in flight*)

= $P(\overline{\textit{explodes during lift-off or guidance system fails in flight}})$

= 1 – 0.0006999 (From (b))

= 0.9993001 (5)