**Question 1** Let q be the probability that B chooses H. Then in order for A to be indifferent between H and T we must have 5q - (1 - q) = -q + (1 - q). Thus, q = 0.25. Thus,

Player A's expected payoff is 0.5

### Question 2

(a) Then pure strategy Nash equilibria exist

If pure strategy equilibria exist, then mark which ones are equilibria (the first strategy listed is that of player A.

Stag, Stag Rabbit, Rabbit

(b) Let p be the probability that B chooses Stag. In equilibrium A must be indifferent, i.e., 8p + 0(1 - p) = 5p + 2(1 - p). Solving this equation for p yields p = 0.4

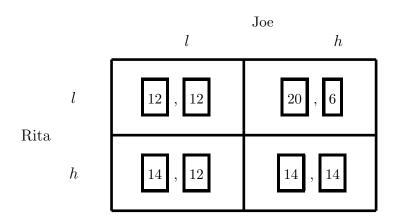
In the mixed strategy equilibrium player A will hunt the stag with probability

0.4

Since the game is symmetric, Player B will hunt the stag with probability

0.4

#### Question 3



There is no pure strategy equilibrium. Let q be the probability that Joe chooses l. Then Rita must be indifferent between l and h, i.e., 12q + 20(1 - q) = 14q + 14(1 - q) = 14. Thus, q = 3/4.

If p is the probability that Rita chooses l then 12p+12(1-p)=6p+14(1-p), i.e., p = 1/4.

Rita chooses low effort with probability 1/4

Joe chooses low effort with probability 3/4

Rita gets an A with probability

13/16 = 0.8125

and a B with probability

$$3/16 = 0.1875$$

Joe gets an A with probability

3/16 = 0.1875

and a B with probability

$$13/16 = 0.8125$$

### Question 4

(a) Let p be the cost of insurance. The expected utility from being insured is  $\ln(250,000-p)$ . For a low-risk person the expected utility from being uninsured is  $0.98 \ln(250,000) + 0.02 \ln(50,000)$ . Thus,  $\ln(250,000-p) =$  $0.98 \ln(250,000) + 0.02 \ln(50,000).$ 

Then a low-risk consumer's maximum willingness to pay for insurance

For a high-risk person the expected utility from being uninsured is  $0.75 \ln(120,000) + 0.25 \ln(20,000)$ . Thus,  $\ln(250,000-p) = 0.75 \ln(250,000) +$  $0.25 \ln(50,000)$ .

A high-risk consumer's maximum willingness to pay for insurance is

# 77,855.98

The expected payment is 0.95 \* 0.02 \* 200,000 + 0.05 \* 0.25 \* 200,000.

The price at which the insurance company would break even if they

insure both high and low risk consumers is **6,300** 

Thus, both types

will be insured).

(b) If a person has a pre-existing condition then this indicates that the person is a high-risk type. Thus, the expected cost is 50,000. Otherwise, the expected insurance payment is 0.99\*4,000+0.01\*50,000 = 2,380. Then the premium charged to a person with a pre-existing condition is

50,000

Then the premium charged to a person without a pre-existing condition is 4,460

Question 5 MC = 30. Thus,

$$30 = p\left(1 - \frac{4}{5}\right) = p/5.$$

the firm charges a price p = 150

the firm's profit/unit is 120

Now

$$30 = p\left(1 - \frac{1}{4}\right) = 3p/4.$$

the firm charges a price p=40

the firm's profit/unit is 10

**Question 6** The manager maximizes  $0.02(200e - 2e^2) - 2e$ . This expression is maximized when the derivative is 0, i.e., 4 - 0.08e - 2 = 0, which implies e = 25. The owner's profit is therefore  $0.98(200e - 2e^2)$ . Therefore,

If s = 0.02, the owner's payoff is 3,675

If s = 0.1 then the manager maximizes  $0.1(200e - 2e^2) - 2e$ . Again, this expression is maximized when the derivative is 0, i.e., 20 - 0.4e - 2 = 0, which implies e = 45.

If s=0.1, the owner's payoff is 4,455

**Question 7** The price elasticity of demand is  $\epsilon = -0.1 p/(20-0.1p) = p/(p-200)$ . Thus,

$$40 = p\left(1 + \frac{p - 100}{p}\right) = p - 200 + p = -200 + 2p.$$

Thus, The profit maximizing price is 120

The firm sells 8 units

Revenue is 960. Cost are c(8) = 420. Thus,

The firm's profit is 540

## Question 8

(a) The price elasticity of demand is  $\epsilon_P = \frac{10p}{10p-1000} = \frac{p}{p-100}$ . Marginal costs are 40. Thus,  $40 = p\left(1 + \frac{p-100}{p}\right) = p + p - 100$ . Thus,

The firm will charge a price p=70

Demand is D(70) = 300. Thus, revenue is 21,000. Costs are c(300) = 13,000. Thus,

The firm's profit is 8,000

Individual demand is Q = y/100 = 300/100 = 3. Thus, an individual consumer spends 210 Dollars, which implies that m = 10,000 - 210 = 9,790. Thus, utility is u(3,9790) = 10,045.

A consumer's utility is 10,045

(b) Now marginal costs are 50. Thus,  $50 = p \left(1 + \frac{p-100}{p}\right) = p + p - 100$ .

The firm will charge a price p = 75

Demand is D(75) = 250. Thus, revenue is 18,750. Costs are c(250) = 13,500. Thus,

The firm's profit is now 5,250

The government's total tax revenue is 2,500

Individual demand is Q=y/100=250/100=2.5. Thus, an individual consumer spends 187.50 Dollars, which implies that m=10,000-187.50=9,812.50. Thus, utility is u(4,9812.5)=10031.25.

A consumer's utility is 10031.25

Thus, each consumer's utility loss is 13.75. Given that there 100 consumers, total loss is 1,375. The firm loses 2,750. The tax gain is 2,500. Thus,

The dead weight loss generated by the tax is 1,625

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Thus, for each Dollar of taxes raised, the loss is 65 cents