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Spent 6hrs

Yes, I followed the honor code.

(a)

Hospital's expected yearly revenue – 65M.

300 rooms could be financed with this revenue.

The probability with which a given patient is placed in a single room is 1/5.

The probability with which a given patient is placed in a room with another patient is 4/5.

(b)

V_L(standard) = P(standard) = 0

V_H(deluxe) – P(deluxe) >= V_H(standard) – P(standard)

P(deluxe) = V_H(deluxe) – V_H(standard) + P(standard)

P(deluxe) = V_H(deluxe)

Therefore, $P_i^* = V_i$

(c)

I greater than equal to X.

(d)

Given X deluxe room used by single patients, there are 400 - X rooms available in the hospital.

500 – X patients apply for a standard room.

q(x) = [(400 – X) – 100] / (500 – X)

(e)

Standard = q(double) *(0) + q(alone)*(v)
= 0 + q(X)(v)
= [(300-x)/(500-x)]*v

Deluxe = v – p

What is the market clearing price?

X^{th} person standard payoff = X^{th} person deluxe payoff

$q(X-1)V_x = V_x - P$

$p = V_x(1-q(x-1))$

$p = V_x(1-[(299-x)/(499-x)])$

(f)

$P = V_{50} * (1-q(49)) = (3800)*(1-q(49)) = 1692.650334$

$P = V_{75} * (1-q(74)) = (3500)*(1-q(74)) = 1650.943396$

$P = V_{100} * (1-q(99)) = (3300)*(1-q(99)) = 1654.135338$

$P = V_{125} * (1-q(124)) = (3100)*(1-q(124)) = 1657.754011$

$P = V_{150} * (1-q(149)) = (2900)*(1-q(149)) = 1661.891117$

$P = V_{175} * (1-q(174)) = (2700)*(1-q(174)) = 1666.666667$

Revenues :
X = 50 → 65.000.000 + 50(1692.650334)(52) = 69400890.87
X = 75 → 65.000.000 + 75(1650.943396)(52) = 71438679.24
X = 100 → 65.000.000 + 100(1654.135338)(52)= 73601503.76
X = 125 → 65.000.000 + 125(1657.754011)(52) = 75775401.07
X = 150 → 65.000.000 + 150(1661.891117)(52) = 77962750.71
X = 175 → 65.000.000 + (175)(1666.666667)(52)= 80166666.67
X* = 175 allows the hospital to fund the 400 beds as the revenue becomes 80166666.67

(g)

1) Expected payoff under the 300-bed hospital and no-discrimination scheme Vi/5

2) Expected payoff under the 400-bed hospital and X^* deluxe rooms scheme [(300-x)/(500-x)] * V_i

3) Total weekly increase in surplus accruing to patients who pick standard rooms

$[(300-x)/(500-x)]*V_i >= (V_i/5)$

Discrimination is better for the patient when

$[(300-X)/(500-X)]*V_i >= V_i/5$

1500-5X >= 500 – X

4X <= 1000

X <= 250

(h)

$V_i - P(175) - (V_i/5)$

(i)

This price discrimination scheme is pareto efficient. The expected payoff for all patients increases; however, the rich patients gain more than the poor patients. In other words, the gain of rich patients is higher than the gain of poor patients.