

EXAM 2

NAME: _____

**AEM 4160: STRATEGIC PRICING
CORNELL UNIVERSITY
PROFESSOR JURA LIAUKONYTE**

Show all work. Write legibly.

Calculators permitted.

No computers.

Points:	Possible	Obtained
Total	100	

1. **(Total 36 points)** *Pharmaceutical Pricing*

Consider the following hypothetical scenario about a new vaccine.

Research indicates that the likelihood of getting Alzheimer's is around 0.9% and, generally, it is diagnosed in people 65 years old or older. *GlaxoSmithKline* has gone successfully through the approval process of their new (first ever) vaccine to prevent Alzheimer's. To be effective, the vaccine has to be administered before any of the Alzheimer's symptoms develop. Clinical trials and general health research indicate that:

- The new vaccine is 75% effective
- Life expectancy with Alzheimer's is 70 years
- Life expectancy without Alzheimer's is 88 years
- For simplicity assume that Quality Adjusted Life Year (QALY) per year with and without Alzheimer's is the same and is equal to 1.0 for individuals under 75 years and equal to 0.8 if they are 75 or older.
- *GlaxoSmithKline* intends to set the price of the new vaccine at \$1500.

a) **(17 points)** Assuming there are no other costs associated with administering the vaccine and no costs associated with treating Alzheimer's, calculate the cost per QALY. Show all work.

b) (7 points) Suppose that vaccine prices are set so that the cost of QALY comes out to \$40,000. What is the price that corresponds to this level of cost of QALY? Taking into account *just* the cost per QALY (and disregarding other possible pricing factors), would the resulting price be reasonable based on general health policy guidelines?

c) (6 points) According to the Census Bureau and the Current Population Survey, the top 2 most risky occupations (by rate of death occurrence on the job) are the following:

Occupation	Probability of Death
Forestry & fishing occupations	0.000872=0.0872%
Motor vehicle operators	0.000176=0.0176%

Suppose that we know that the yearly income difference between forestry professionals and motor vehicle operators is \$6000. Calculate the VSL based on this information.

d) (6 points) What does the VSL measure? What are the justifications of using VSL or QALY?

2. (Total 19 points) *Hotel room pricing with capacity constraints*

The Miami Ocean Hotel in Miami, FL has 183 rooms. Miami Ocean offers an $r_L = \$229$ (low fare) discount fare targeting leisure travelers. Regular fare is $r_H = \$318$ (high fare) targeting business travelers. There is no shortage of demand for low fare rooms. However, the demand for high fare rooms is uncertain and depends on business conventions and conferences going on in Miami. From previous experience and hotel occupancy data, you have estimated that the business traveler demand follows a normal distribution with mean=33 and standard deviation=12.

The last page of your exam has 3 different tables of probabilities that demand for business travelers is less than a certain number of rooms, Q . Only one table (based on the function NORMDIST inputs) is correct. Use the appropriate table to answer the following questions.

a) **(8 points)** What are the underage and overage costs in this example?

b) **(5 points)** How many rooms should be protected for high fare travelers? What should the booking limit be for low fare reservations? Show all the work.

c) **(6 points)** Suppose that the hotel made a mistake estimating the standard deviation of the expected demand, and it turns out that it is 5, instead of 12 (the mean was calculated correctly). With this information, would the optimal level of rooms protected for high fare travelers **increase or decrease** with respect to the number you got in (b) (you do not need to recalculate the exact number of rooms that should be protected for high travelers under this new distribution). Intuitively explain why.

3. **(9 points)** In the New York City stereo wars, Crazy Eddie had made his trademark “*We cannot be undersold. We will not be undersold. Our prices are the lowest....guaranteed. Our prices are insane.*” His main competitor Newmark & Lewis was no less ambitious. With any purchase you get the store’s “*Lifetime low-price guarantee*”. It promises to rebate double the difference if you can find a lower price elsewhere. If after your purchase from Newmark you find the same item at a lower price (proof of purchase required), in the marketing area, during the lifetime of your purchase, Newmark will give you a 200% gift certificate refund (100% of the price difference plus an additional 100%).

Carefully explain what the effects of these offers on competition between the two retailers and their profits are.

4. **(Total 26 points)** *Information goods*

a) **(6 points)** Draw the Average Fixed Cost (AFC), Average Variable Cost (AVC), and Average Total Cost (ATC) curves for (i) a typical, non-digital product facing scarcity of resources and (ii) a digital product (2 graphs with **3 curves** on each graph). Label both X and Y axes.

b) **(4 points)** What is Freemium pricing? Give two examples of two products/services that engage in Freemium pricing.

c) **(7 points)** What does the Metcalfe's law say? What are the implications of this law?

d) **(4 points)** What does the Moore's law say?

e) **(5 points)** Explain the "the long tail" hypothesis. Use a graph for your explanation.

5. **(Total 10 points)** *Behavioral pricing*

a) **(5 points)** What is anchoring/framing effect? What implications does it have for pricing?

b) **(5 points)** Briefly describe JC Penney's "fair and square" pricing strategy. Explain why it was considered to be a failure. Your explanation should include at least one concept from behavioral economics.

APPENDIX

1		2		3	
NORMDIST (Q, 33,12,1)		NORMDIST (Q, 229,89,1)		NORMDIST (Q, 229,318,1)	
Number of Rooms Q	Probability that demand is less than Q	Number of Rooms Q	Probability that demand is less than Q	Number of Rooms Q	Probability that demand is less than Q
1	0.003830381	1	0.004661188	1	0.008197536
2	0.004892537	2	0.005649173	2	0.01072411
3	0.006209665	3	0.006818862	3	0.013903448
4	0.007831677	4	0.008197536	4	0.017864421
5	0.009815329	5	0.009815329	5	0.022750132
6	0.012224473	6	0.011705298	6	0.02871656
7	0.01513014	7	0.013903448	7	0.035930319
8	0.018610425	8	0.016448696	8	0.044565463
9	0.022750132	9	0.019382787	9	0.054799292
10	0.027640146	10	0.022750132	10	0.066807201
11	0.033376508	11	0.026597574	11	0.080756659
12	0.040059157	12	0.030974076	12	0.096800485
13	0.047790352	13	0.035930319	13	0.11506967
14	0.056672755	14	0.04151822	14	0.135666061
15	0.066807201	15	0.047790352	15	0.158655254
16	0.078290204	16	0.054799292	16	0.184060125
17	0.09121122	17	0.062596873	17	0.211855399
18	0.105649774	18	0.071233377	18	0.241963652
19	0.121672505	19	0.080756659	19	0.274253118
20	0.139330247	20	0.09121122	20	0.308537539
21	0.158655254	21	0.102637252	21	0.344578258
22	0.179658669	22	0.11506967	22	0.382088578
23	0.202328381	23	0.128537149	23	0.420740291
24	0.226627352	24	0.143061192	24	0.460172163
25	0.252492538	25	0.158655254	25	0.5
26	0.279834464	26	0.175323945	26	0.539827837
27	0.308537539	27	0.193062337	27	0.579259709
28	0.33846112	28	0.211855399	28	0.617911422
29	0.36944134	29	0.231677575	29	0.655421742
30	0.401293674	30	0.252492538	30	0.691462461
31	0.433816167	31	0.274253118	31	0.725746882
32	0.466793248	32	0.296901429	32	0.758036348
33	0.5	33	0.320369191	33	0.788144601
34	0.533206752	34	0.344578258	34	0.815939875
35	0.566183833	35	0.36944134	35	0.841344746
36	0.598706326	36	0.39486291	36	0.864333939
37	0.63055866	37	0.420740291	37	0.88493033
38	0.66153888	38	0.446964883	38	0.903199515
39	0.691462461	39	0.473423536	39	0.919243341
40	0.720165536	40	0.5	40	0.933192799

EXTRA PAGE FOR CALCULATIONS