

Analytical Methods Review Problems

1. Your client, Grande Gourmet Enterprises (GGE), operates a high-end restaurant chain with an English mansion theme. It wishes to open a new restaurant in our city and has located the ideal property, an elegant, though crumbling, old place that the Smiths, now retired and living in Florida, have recently put on the market for a mere \$1,000K, which they surely will receive if we don't act promptly. (The building is and will remain unoccupied because it is not suitable for living.) The problem for GGE is that a zoning variance is required if the place is to be converted into a restaurant; the pending request will not be decided for a year and has a 50% chance of success. GGE has no interest in the land if the request is denied and for this reason tells you that it has ruled out taking the chance of purchasing it now. However, the Smiths recently indicated that they are willing to hold off on the sale, granting GGE an exclusive option to purchase the property in a year, if we (a) pay them \$200K up front (which they keep either way) and an additional \$1100K for the property next year if we choose to exercise the option. If we do not do so, the Smiths will sell to some other buyer next year for an amount very close to \$950K. (Such other buyer will undoubtedly demolish their old home and build something new in its place.)

Additional relevant facts are:

- If we don't act on the Smiths' property, we will buy another parcel, build from scratch, and have an expected profit of \$5000K (taking into account everything, including the purchase price and construction costs).
- If we wait, the zoning permission is granted, and we exercise the option, our expected profit is \$8000K (taking into account everything, including the \$200K option payment and the purchase price).
- However, this high profit will only be realized if the Smiths hire various workers, at a cost of \$100K, to do a variety of subtle things that they, due to their years of living in the old place, know are necessary to maintain the premises in the interim. Otherwise, the obvious deterioration will be so severe that it will render the place useless, and our expected profit would be only \$3500K rather than \$8000K.
- If we wait and do not exercise the option to purchase from the Smiths, we will buy another parcel, build from scratch, and have an expected profit of \$4000K (taking into account everything, including the option payment).

Should GGE purchase the option from the Smiths? Draw and solve a tree to help in answering this question. How would you intuitively explain your advice to GGE?

2. Company A and Company B have exactly the same balance sheets on December 30, 2000, except for the fact that Company B has \$ 5 million more in cash at that time.

1. On December 31, 2001, just before leaving the office for the night, Jane Jones, a scientist in Company A's research department discovers a new technical process that will greatly improve Company A's productivity in years ahead. It is estimated that the process will save Company A millions of dollars in the coming years. What accounting treatment?

2. On December 31, 2001, the president of Company B closes a deal to purchase a small firm, Target X whose that has developed a new production process that will save Company B millions of dollars in the coming years. Company B pays \$5 million for the acquisition. Target X has not other assets or liabilities. What accounting treatment?

3. You represent the New Ames Museum of Art (NAMA), a nonprofit organization founded a few years ago with a gift of about \$200 million to acquire and renovate the Old Ames Art Museum (OAAM). By the end of 2001, NAMA had completed its acquisition of OAAM, and, during 2002, it enjoyed an uneventful year of routine operations. NAMA's most recent balance sheet and income statement are presented below.

NAMA's president, Harvey Hanover, would like your advice on the accounting aspects of the organization's next major project: the renovation of its principal gallery. The cost of the renovation is projected to be \$50 million. Harvey has been told that the museum could fund the renovation in either of two ways:

- First, through the sale of some of NAMA's investment securities, or
- Second, by increasing the amount of the \$100 million loan that NAMA obtained from the National Endowment of the Arts (NEA) to finance a portion of its acquisition of OAAM.

Harvey is concerned that the manner in which NAMA chooses to fund the renovations could have a significant impact on the museum's financial position. NAMA's trustees take considerable pride in the fact that the museum showed a modest profit last year. Harvey would like to know which of the two funding options would be preferable both in terms of maintaining the institution's profitability and in terms of safeguarding the organization's overall financial health.

What Harvey wants to know are the advantages and disadvantages of the two options.

NAMA Balance Sheet			
December 31, 2002			
(millions of dollars)			
Assets		Liabilities & Surplus	
Investment Securities	\$100	NEA Loan	\$100
Art	\$100	Total Liabilities	\$100
Buildings and Property	\$100		
Total Assets	\$300	Surplus	\$200

NAMA Income Statement 2002	
(millions of dollars)	
Revenues:	
Tickets and Concession Fees	\$35
Interest on Investment Securities	\$5
Total Revenues	\$40
Expenses:	
Salaries and Other Expenses	(\$34)
Operating Earnings	\$6
Interest on NEA Loan	(\$3)
Net Income	\$3

4. Suppose you work in a legal services agency, assisting low-income clients with a variety of financial matters. One of your clients, Sara Sanborne, is about to purchase her first home. The price of the property is \$125,000. Sara has saved \$25,000, which she is planning to use for a down payment. She intends to borrow the remaining \$100,000 dollars and has been working with a local mortgage broker – North-South Financial, Inc. (“NSFI”) – to find her an appropriate loan from a group of potential lenders who provide residential financing in Sara’s region. NSFI has presented Sara with two financing options:

1. A 30-year fixed-rate mortgage; annual payments for this loan are \$7584, but \$1000 is due in cash at closing as compensation for its services.
2. A 30-year fixed-rate mortgage; annual payments for this loan are \$8088, no money is due at closing.

Sara would like your advice on which loan she should choose. She wants the best deal possible, but she is also going to be quite short of cash once she makes the down payment on her new house.

How would you approach this problem?

5. Compute the “theoretically correct” lost future earnings for a 63-year old man, Roger Rogers, that was injured and unable to work. Roger’s partnership agreement required retirement at 65, so he only expected to work 2 more years. His salary at age 63 was \$600,000. The average partner in the firm had been experiencing salary increases of 12% a year. Assume Roger’s tax rate was 33% and risk-free nominal interest rates (T-bills) are currently 4%.

If you were representing the defendant, are there any adjustments to the “theoretically correct” damage award that you would argue for?

6. You are negotiating a settlement in a wrongful death action for your client, Global Gas Works. They’re ready to admit liability: the only question is how a jury would assess the damages. You’ve been able to locate 10 trials on facts similar to this one where Ames juries have assessed damages. The amounts of those verdicts are: \$1m, \$2m, \$5m, \$5m, \$2m, \$2m, \$7m, \$3m, \$1m and \$2m. Your client wants an estimate of how likely it is that a jury would award \$9m or more if you fail to settle. Also, explain intuitively how you arrived at this estimate.

7. From a recently released Ames study of the new MASIK technique for the surgical correction of nearsightedness: “Using the standard 10-point scale for improvement of vision, we found an average score of 7.2 in our study of 400 MASIK patients randomly selected from those treated at the Massachusetts Eye and Ear Hospital.” MASIK, a competitor of LASIK, uses a neon laser instead of an argon laser, which results in a 30% cost saving per operation for MASIK versus LASIK. The effectiveness of LASIK has been well studied, and it is known to produce, on average, a vision improvement score of 7.5 with a standard deviation of 2. It had been thought, until the release of this study, that MASIK and LASIK were equally effective for the treatment of nearsightedness.

Has the study found a significant difference between the effectiveness of MASIK and the effectiveness of LASIK? Explain your answer.

8. You are representing a Hispanic client who is suing a local cannery for wage discrimination. Specifically, he alleges that the cannery pays Hispanics who work on the fish packing line lower starting salary than non-Hispanics who are hired to do the same work. Your statistician enters the available data and returns with the following regression equation (standard errors are in parentheses):

$$H = 2.63 + .85\text{Exper} + .08\text{Spd} + .03\text{Comp} + .09\text{Sup} - .88\text{Hisp}$$

$$\begin{array}{cccccc}
 & (.09) & (.2) & (.01) & (.16) & (.8)
 \end{array}$$

H=Starting Hourly Wage

Spd=Score on a test of packing speed (range 50-100)
 Comp=Score on a test of general intellectual competence (range 50-100)
 Sup=Supervisor ratings of on the job performance (range 1-10)
 Exper=Years of experience in the canning business
 Hisp= 1 if Hispanic, 0 otherwise

Are you pleased with the result? Why or why not?

9. To evaluate a proposed alternative to the LSAT, the SALT, which has roughly the same content as the LSAT and is scored on the same scale, 46 students who had taken the LSAT and were going to attend Harford Law School were given the SALT the summer before law school. At the end of their first year, a regression analysis was performed using the subject scores on the LSAT and the SALT and some additional data, resulting in the following regression equation (standard errors are in parentheses).

$$\begin{array}{cccccc}
 \text{LGPA} = 3.0 + .1 \text{UGPA} + .002 \text{LSAT} + .001 \text{SALT} - .01 \text{HW} + .1\text{HD} \\
 \qquad \qquad \qquad (.05) \qquad \qquad (.1) \qquad \qquad (.15) \qquad \qquad (.01) \qquad \qquad (.2)
 \end{array}$$

LGPA is first year law GPA.

UGPA is undergraduate GPA.

LSAT is LSAT score (scale 120:180).

SALT is SALT score (scale 120:180).

HW is hours per week studied as reported by the subjects on a year-end questionnaire.

HD is handedness; 1 for left handed, 0 for right handed (The Dean of Harford was interested in studying the impact of handedness on student performance).

Standard errors are given in parenthesis under the regression coefficients.

- A. What first year law school GPA would you estimate for a student who had an undergraduate GPA of 3.7, scored 160 on the LSAT, scored 120 on the SALT, said they studied 10 hours per week and was left handed?
- B. Which of the coefficients are statistically significant? For any that aren't, can you offer an explanation for why they aren't? Does the SALT appear to be a good predictor of first year law school grades?
- C. Do you have any other comments on the design of the study?