

BUS 735: Business Decision Making and Research

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Take Home Exam 2

1. Suppose you work for a for-profit university called Spherical-Map University that sells easy, low workload college degrees in Hospitality Management. To determine what tuition to charge its students, your boss would like you to investigate the total earnings Wisconsin workers make in the leisure and hospitality industry. The dataset `leisure_wages.xls` contains the actual total earnings made in the Leisure and Hospitality industry in the state of Wisconsin for every quarter from 2001 through 2009. This data was obtained from the *Bureau of Labor Statistics*, <http://www.bls.gov>.
 - (a) Does the data appear to have a seasonal component? If so, what time of year are earnings in the industry the highest? Which are the lowest? If you were in charge of setting up the academic calendar, during what time of year would you like your students to graduate?
 - (b) Does the data appear to have a trend? If so, describe the trend.
 - (c) Generate Adjusted Exponential Smoothing (AES) forecasts for the data using a smoothing constant equal to 0.2 and a trend smoothing constant equal to 0.2. What is the root mean squared error? How does this compare to the naive forecast?
 - (d) Generate a regression model to predict wage earnings that uses time and seasonal dummies as explanatory variables. What is the root mean squared error? How does this compare to the AES forecast and the naive forecast?
 - (e) Using the results from your regression model in your previous answer, is there statistically significant evidence of a time-trend in earnings? On average how much do wage earnings increase or decrease by over the course of one year?
 - (f) Of the models you examined, use the best fitting model to generate forecasts for earnings in the leisure and hospitality for each quarter of the next two years.
2. Sue sells six selections of sea shells on the sea shore. Her selections include large-cone shells, medium-cone shells, small-cone shells, large-flat shells, medium-flat shells, and small-flat shells. The time it takes to collect and inventory each type of shell and the profits for each type are as follows:

Shell-Type	Time (minutes)	Profit
Large-cone	1.5	\$1.50
Medium-cone	2	\$0.75
Small-cone	0.5	\$0.50
Large-flat	1	\$0.75
Medium-flat	0.5	\$0.50
Small-flat	0.5	\$0.25

Sue hires shell collectors and has 4 labor hours available. Sue's sea shells sales slump with a small selection of shells so she must have an equal number of cone shaped shells and flat shaped shells and she must have at least 20 of each type of shell. Also, broken sea shells don't get sold, so you cannot sell a fraction of a shell.

- (a) What is the objective function?
 - (b) List all constraints.
 - (c) How many of each type of shell should she keep in inventory to maximize profits? What is her total profit?
 - (d) How much would sue be willing to pay for one additional *hour* of labor?
3. You have just been hired as head football coach at State Tech. Your football coaching staff focuses its new player recruiting efforts on high schools in six states: Florida, Georgia, Virginia, Pennsylvania, New York, and New Jersey. You have seven assistant coaches who handle the recruiting, so you may assign two coaches to one of the states and one coach to every other state. Every assistant coach has recruited in every state at sometime in the past. The coaches success rate (percentage of target high-school recruits that ended up deciding on Tech State) are given in the table below. Who should you assign to each state to maximize the expected success rate?

Coach	State					
	Georgia	Florida	Virginia	Pennsylvania	New York	New Jersey
Allen	62	56	65	71	55	63
Bush	65	70	63	81	75	72
Crumb	43	53	62	55	64	50
Doyle	58	66	70	67	71	49
Evans	77	73	69	80	80	74
Fouch	68	73	72	80	78	57
Goins	72	60	74	72	62	61