Student: Juan Rodriguez	**Instructor:** Mohan Sundaram	**Assignment:** HW 7-CH 11- Modelling
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1. Suppose that a commuter drives 35 miles round trip to work for 20 days each month, achieves a fuel economy of 36 mpg, and drives an additional 250 miles each month. Develop a spreadsheet model for the monthly gasoline usage using the data provided. Apply the principles of spreadsheet engineering in developing your model.

Complete the spreadsheet below.

(Round to the nearest integer as needed.)

	A	B
1	Data	
2	miles/day	_____
3	days/month	_____
4	additional miles/month	_____
5	fuel economy (mpg)	_____
6	Model	
7	Total miles/month	(1) _____
8	Gallons consumed	(2) _____
6	Model	
7	Total miles/month	_____
8	Gallons consumed	_____

(1)
- ○ =B2*B3*B4
- ○ =B2(B3+B4)
- ○ =B2*B3+B4
- ○ =B2+B3+B4

(1)

(2)
- ○ =B5/B7
- ○ =B2/B7
- ○ =B7/B2
- ○ =B7/B5

2. Develop a spreadsheet model to determine how much a person or a couple can afford to spend on a house. Lender guidelines suggest that the allowable monthly housing expenditure should be no more than 28% of monthly gross income. From this, you must subtract total nonmortgage housing expenses, which would include insurance and property taxes and any other additional expenses. This defines the affordable monthly mortgage payment. In addition, guidelines also suggest that total affordable monthly debt payments, including housing expenses, should not exceed 36% of gross monthly income. This is calculated by subtracting total nonmortgage housing expenses and any other installment debt, such as car loans, student loans, credit card debt, and so on, from 36% of total monthly gross income. The smaller of the affordable monthly mortgage payment and the total affordable monthly debt payments is the affordable monthly mortgage. To calculate the maximum that can be borrowed, find the monthly payment per $1,000 mortgage based on the current interest rate and duration of the loan. Divide the affordable monthly mortgage amount by this monthly payment to find the affordable mortgage. Assuming a 20% down payment, the maximum price of a house would be the affordable mortgage divided by 0.8. Use the following data to test your model:

Total monthly gross income = $6,300
Nonmortgage housing expenses = $380
Monthly installment debt = $600
Monthly payment per $1,000 mortgage = $7.25

Enter the formulas for the spreadsheet that implements this model.

	A	B	C	D
1	Total Monthly Gross Income	$6,300.00		
2	Allowable Monthly Housing Expenditure	(1) _____	Max Percentage	0.28
3	Total Non-Mortgage Housing Expenses	$380.00		
4	Affordable Monthly Mortgage Payment	(2) _____		
5	Monthly Installment Debt	$600.00		
6	Total Affordable Monthly Debt Payments	(3) _____	Max Percentage	0.36
7	Affordable Monthly Mortgage	(4) _____		
8	Monthly Payment per $1000 mortgage	$7.25		
9	Maximum that can be borrowed	(5) _____		
10	Down Payment	20%		
11	What one can afford to spend on a house	(6) _____		

Complete the following spreadsheet model.

(Type integers or decimals rounded to two decimal places as needed.)

	A	B
1	Total Monthly Gross Income	$6,300.00
2	Allowable Monthly Housing Expenditure	$ _____
3	Total Non-Mortgage Housing Expenses	$380.00
4	Affordable Monthly Mortgage Payment	$ _____
5	Monthly Installment Debt	$600.00
6	Total Affordable Monthly Debt Payments	$ _____
7	Affordable Monthly Mortgage	$ _____
8	Monthly Payment per $1000 mortgage	$7.25
9	Maximum that can be borrowed	$ _____
10	Down Payment	20%
11	What one can afford to spend on a house	$ _____

(1)
- ○ =B1*D2
- ○ =B1/D2
- ○ =B1/D6
- ○ =B1*D6
- ○ =B2-B3

(2)
- ○ =B3*D2
- ○ =B2-B3
- ○ =B2+B3
- ○ =B1-B3
- ○ =B3+B5
- ○ =B3*D6

(3)
- ○ =B1*D6-B5+B3
- ○ =B1*D2-(B5+B3)
- ○ =(B1-B5-B3)*D6
- ○ =B1*D6-(B5+B3)
- ○ =B1*D2-B5+B3
- ○ =(B1-B5-B3)*D2

(4)
- ○ =MIN(B4,B6)
- ○ =B6-B4
- ○ =AVERAGE(B4,B6)
- ○ =MAX(B4,B6)

(5)
- ○ =B5/B8*1000
- ○ =B3/B8*1000
- ○ =B7/B8*1000
- ○ =B5/B8
- ○ =B7/B8
- ○ =B3/B8

(6)
- ○ =B9*(100%-B10)
- ○ =B9/(100%-B10)
- ○ =B9/(100%-D6)
- ○ =B9/(100%-D2)
- ○ =B9/B10
- ○ =B9*B10

3. The admissions director of an engineering college has $400,000 in scholarships each year from an endowment to offer to high-achieving applicants. The value of each scholarship offered is $20,000 (thus, 20 scholarships are offered). The benefactor who provided the money would like to see all of it used each year for new students. However, not all students accept the money; some take offers from competing schools. If they wait until the end of the admission deadline to decline the scholarship, it cannot be offered to someone else because any other good students would already have committed to other programs. Consequently, the admissions director offers more money than available in anticipation that a percentage of offers will be declined. If more than 20 students accept the offers, the college is committed to honoring them, and the additional amount has to come out of the dean's budget. Based on prior history, the percentage of applicants that accept the offer is about 80%. Develop a spreadsheet model for this situation to evaluate how much money must be allocated from the dean's budget based on the number of scholarships offered, 30.

Write Excel formulas for the following spreadsheet model.

	A	B	C
1	Number of Offers		
2	Acceptance Percentage	80%	
3	Scholarship Amount	$20,000	per student
4	Accepted Scholarships	(1) _____	
5	Available Scholarships		
6	Extra Funds Needed	(2) _____	

Complete the following spreadsheet model to evaluate the extra funds needed.

(Type integers or decimals. Do not round.)

	A	B	C
1	Number of Offers	_____	students
2	Acceptance Percentage	80%	
3	Scholarship Amount	$20,000	per student
4	Accepted Scholarships	_____	scholarships
5	Available Scholarships	_____	scholarships
6	Extra Funds Needed	$ _____	

(1)
- ○ =B1*B3
- ○ =B2*B3
- ○ =B1-B2
- ○ =B1*B2

(2)
- ○ =MAX(0,B4-B5)*B3
- ○ =MAX(0,(B4-B5)*B3)*B3
- ○ =MAX(0,B5-B4)*B3
- ○ =MAX(B4,B5)*B3

4. A gasoline mini-mart orders 25 copies of a monthly magazine. Depending on the cover story, demand for the magazine varies. The mini-mart purchases the magazines for $1.74 and sells them for $3.53. Any magazines left over at the end of the month are donated to hospitals and other health care facilities. Modify the newsvendor example spreadsheet to model this situation. Use what-if analysis to investigate the financial implications of this policy if the demand is expected to vary between 10 and 30 copies each month.

[1] Click the icon to view the newsvendor example spreadsheet.

The demand must be at least _____ copies for the gasoline mini-mart to break even.
(Type a whole number.)

1: Newsvendor model spreadsheet

	A	B
1	Newsvendor Model	
2		
3	Data	
4		
5	Selling price	$3.53
6	Cost	$1.74
7	Discount price	$0
8		
9	Model	
0		
11	Demand	10
12	Purchase Quantity	25
13		
14	Quantity Sold	
15	Surplus Quantity	
16		
17	Profit	

The formula for the quantity sold is =MIN(B11,B12).
The formula for the surplus quantity is =MAX(0,B12-B11).
The formula for the profit is =B14*B5-B12*B6.