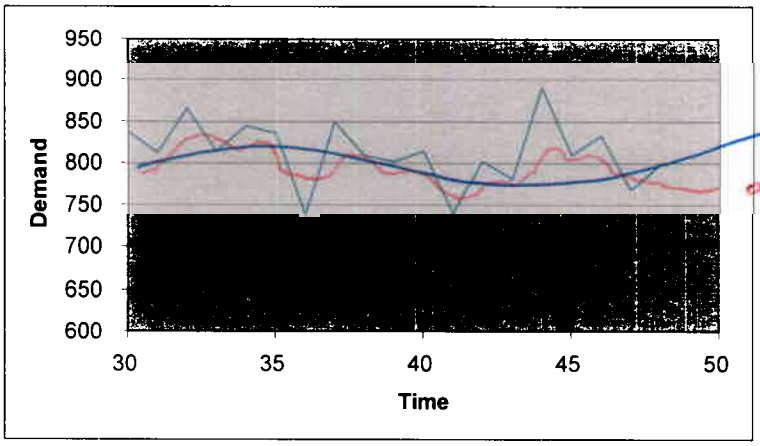
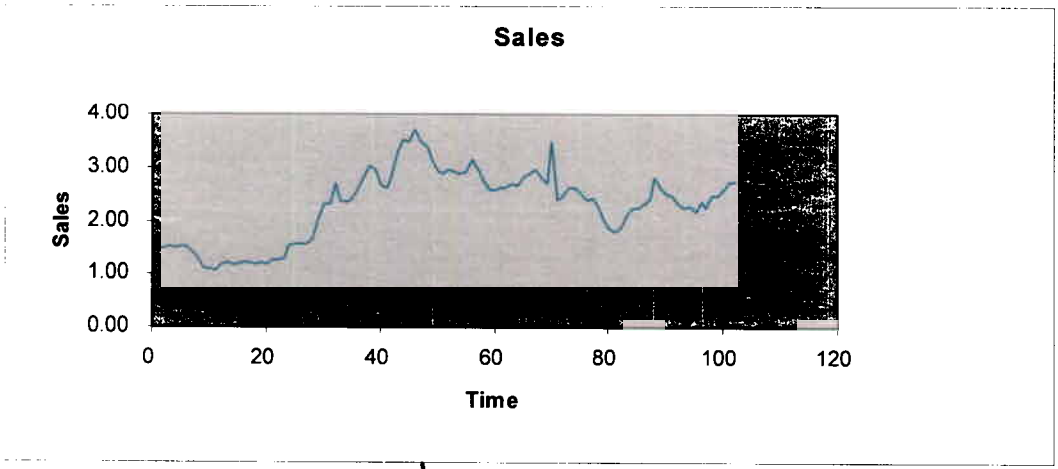
IENG 216
Cost Estimating for Engineers
Sample Probs (216)

1. Consider the time series shown below which gives the monthly demand for an item over a 18 month period. You are to sketch a forecast curve for a simple exponential smoothing model using $\alpha = 0.25$ and a second curve using $\alpha = 0.75$. Be sure to label the curves.



2. You wish to make a short term (3 steps ahead) forecast for the monthly sales data shown below. Based on the plot, estimate the type of forecast model you might use and give reasons to support your proposed model. (Note: There may be more than one correct answer. You need only provide one model).



Definite trend, appears to have a cycle but no seasonality
⇒ Double exp smoothing
⇒ possibly Holt-winters

3. (10 pts) Consider the following partial time series for the monthly demand for a particular product.

Fiscal Yr	Month	Demand	(α=.2) Exp Smooth
2001	Jan	864	864
	Feb	869	865 = .2(869) + .8(864)
	Mar	867	865.4 = .2(867) + .8(865)
	Apr	875	867.3
	May	897	873.3

You are given that the exponentially smoothed forecast for January is 864. Using this as an initial value and a smoothing constant of α=0.2 compute exponentially smoothed forecasts for February through May.

4. A second method by which to estimate a trend line is through double exponential smoothing. Using the summary data given below, α=0.3, and values for the smoothed forecast F_t and doubly smoothed forecast F_{2t} for 2003, you are to compute F_t and F_{2t} for 2004 and 2005. You are also to compute a_t and b_t for 2004, 2005. Finally, you are to compute a forecast for 2006 and 2007. (Note: xx denotes previous values computed for F_t and yy denotes previous values computed for F_{2t}.)

K-Corp Crane Division

0.3

Double Exp

Fiscal Y_t	Demand	F_t	F_{2t}	a_t	b_t	F_t
1992	97	xx	yy			
1993	80	xx	yy			
1994	82	xx	yy			
1995	83	xx	yy			
1996	78	xx	yy			
1997	81	xx	yy			
1998	82	xx	yy			
1999	80	xx	yy			
2000	83	xx	yy			
2001	80	xx	yy			
2002	81	xx	yy			
2003	83	91.7	89.2			
2004	82	88.8	89.1	88.5	-0.1	
2005	79	85.9	88.1	83.6	-1.0	
2006						83.6 - 1.0
2007						83.6 - 2.0

5. (10 pts) You are given the following sales forecasts for a new digital camera.

2003	Qtr 1	5,000
	Qtr 2	5,800
	Qtr 3	6,400
	Qtr 4	5,600

Each unit sells for $100. Historically, KDL collects 70% on accounts receivable in the quarter in which the unit is sold. Payment is received in the following quarter for 25% of units sold and 5% of sales are written off. You are given that cash collected on accounts receivable from the last quarter in 2002 is $400,000. Tabulate a sales budget for the coming year (2003).

Camera

	Quarter				
	1	2	3	4	Yr Total
Forecast Sales	5,000	5,800	6,400	5,600	22,800
Price	100	100	100	100	100
Sales	500,000	580,000	640,000	560,000	2,280,000
Accts Rcv	400,000				400,000
Auarter 1	350,000	125,000			475,000
Qrtr2		406,000	145,000		551,000
Qrtr3			448.000	160.000	608.000
Qrtr4				392,000	392,000
Total	750,000	531,000	593,000	552,000	2,426,000

6. (10 pts You are given the following cost information concerning factory overhead and direct labor hours.

Period	Direct Labor	Factory Overhead
1	250	$43,800
2	200	37,400
3	320	49,700
4	270	45,200
5	290	44,000
6	220	42,900
7	280	48,600
8	300	51,000
9	260	47,300
10	230	40,500

low high

$\frac{49,700 - 37,400}{320 - 200} = 102.5$

var rate = $102.5 \times DL$

ovh = Fixed + 102.5 DL

For high

$49,700 = Fixed + 102.5(320)$

$\Rightarrow Fixed = 16,900$

Compute the fixed and variable costs using the High/Low method.

ovhd = $16,700 + $102.5 \times DL$

7. (10 pts) You are given the following year-to-date budget and actual sales and expenses for Logor Inc. Compute the budget variance for each item. Identify which, if any, areas the manager might be concerned and offer some suggestions for possible improvement in performance.

K-Corp, Inc.	Year to Date		
	Budget	Actual	Variance
Sales	$265,000	$240,000	(25,000)
Operating Expenses			
Cost of Goods Sold	$ 47,000	$ 69,000	(22,000)
Sales Salaries	37,000	37,000	0
Sales Commissions	27,000	21,000	6,000
Travel & Entertain.	15,000	18,000	(3,000)
Advertising	27,000	25,000	2,000
Miscellaneous	18,000	23,000	(5,000)
Total	$171,000	$193,000	

coos may too high for sales
sales low