The next tab of this Excel spreadsheet contains the NFL raw data for these problems.

In the National Football League, the philosophy for winning (rushing, passing, defense) seems to go through cycles. Consider a time series of the average number of rushing yards in the NFL per regular season from 1980 to 2008.

1) Make a time series plot. Is there evidence that the average rushing yards is trending in one direction? Describe the general movement of the series.

*2) Fit a **first order autoregressive model [AR(1)]** using y(t) as the response variable and y (t-1) as the input variable. Record the regression equation.*

*3) Based on the **AR(1) model**, forecast the average number of rushing yards in the NFL for the 2009 regular season.*

*4) Calculate the **exponential smoothing models** using Excel damping factors 0.8 and 0.2 For each of the exponential smoothing models forecast the average number of rushing yards in the NFL for the 2009 season.*

*5) Calculate a **moving average model** using k=5 (Excel interval). Forecast the average number of rushing yards in the NFL for the 2009 season.*

NFL data

this is Yt-0

X

	Year (x)	Rushing yards/Game (y)	Lagged Output
1	1980	127.5	
2	1981	130.1	127.5
3	1982	117.8	130.1
4	1983	129.7	117.8
5	1984	123.9	129.7
6	1985	124.9	123.9
7	1986	118.7	124.9
8	1987	123.9	118.7
9	1988	121.4	123.9
10	1989	115.3	121.4
11	1990	113.9	115.3
12	1991	107.7	113.9
13	1992	110.5	107.7
14	1993	110	110.5
15	1994	104.3	110
16	1995	108.1	104.3
17	1996	109	108.1
18	1997	113	109
19	1998	112.7	113
20	1999	106.5	112.7
21	2000	112.6	106.5
22	2001	111.8	112.6
23	2002	116.1	111.8
24	2003	117.9	116.1
25	2004	116.6	117.9
26	2005	112.5	116.6
27	2006	117.3	112.5
28	2007	110.9	117.3
29	2008	114.6	110.9
30			114.6

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.706836
R Square	0.499617
Adjusted R Square	0.480372
Standard Error	4.794259
Observations	28

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	596.6932331	596.693233	25.96020846	2.61501E-05
Residual	26	597.6078384	22.9849169		
Total	27	1194.301071			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*
Intercept	37.90835	15.23946682	2.48751171	0.019603154	6.583179545	69.23352	6.58318
X Variable 1	0.668886	0.131279751	5.09511614	2.61501E-05	0.399036184	0.938735	0.399036

1. From the Time Plot to the left we can see in the NFL that Rushing yards

2.Regression Equation = 0.66888x + 37.9083 = Y Pedicated / Y Hat

3. Predicted 2009 Rush Yards | 114.561948 | 0.66888*(114.6)+3

4. Question 4 Is Down Below!

5. Question 5 is Down Below!

Smoother	More weight on recent value
Dampfact=0.8	**dampfact=0.2**

	Year (x)	Rushing yards/Game (y)			
1	1980	127.5	#N/A	#N/A	
2	1981	130.1	127.5	127.5	
3	1982	117.8	128.02	129.58	
4	1983	129.7	125.976	120.156	
5	1984	123.9	126.7208	127.7912	
6	1985	124.9	126.15664	124.67824	
7	1986	118.7	125.905312	124.855648	
8	1987	123.9	124.4642496	119.9311296	
9	1988	121.4	124.3513997	123.1062259	
10	1989	115.3	123.7611197	121.7412452	
11	1990	113.9	122.0688958	116.588249	
12	1991	107.7	120.4351166	114.4376498	
13	1992	110.5	117.8880933	109.04753	
14	1993	110	116.4104746	110.209506	
15	1994	104.3	115.1283797	110.0419012	
16	1995	108.1	112.9627038	105.4483802	
17	1996	109	111.990163	107.569676	
18	1997	113	111.3921304	108.7139352	
19	1998	112.7	111.7137043	112.142787	
20	1999	106.5	111.9109635	112.5885574	
21	2000	112.6	110.8287708	107.7177115	
22	2001	111.8	111.1830166	111.6235423	
23	2002	116.1	111.3064133	111.7647085	
24	2003	117.9	112.2651306	115.2329417	
25	2004	116.6	113.3921045	117.3665883	
26	2005	112.5	114.0336836	116.7533177	
27	2006	117.3	113.7269469	113.3506635	
28	2007	110.9	114.4415575	116.5101327	
29	2008	114.6	113.733246	112.0220265	
	2009	**Forecast**	**113.9065968**	**114.0844053**