Math 111 – Exam 2 – Take home problem (10 pts.) Name _____

The number of restaurants for a fast food franchises in a city is listed below for several years:

Year	# of restaurants
1	8
2	87
3	190
4	231
5	272
6	269
7	300
8	310

1. Use cubic regression to model the data. Write an equation for the cubic function you found, and give the value of R^2.

$f(x) = y = \underset{a}{.942}x^3 + (\underset{b}{-20.33})x^2 + \underset{c}{158.18}x + (\underset{d}{-137.64})$

$R^2 \approx .991$

2. Use logarithmic regression to model the data. Write an equation for the logarithmic function, and give the value of R^2. $y = a + b \ln x$

$f(x) = y = 6.405 + 152.364 \ln x$

$R^2 \approx .978$

3. a) Use the cubic model to predict the number of restaurants in Year 10.

$f(10) = .942(10)^3 - 20.33(10)^2 + 158.18(x) - 137.64 \approx 353$

b) Use the logarithmic model to predict the number of restaurants in Year 10.

$f(10) = 6.405 + 152.364 \ln(10) \approx 357$

4. On a separate sheet, plot the data points, the cubic regression and the logarithmic regression all on the same graph. A hand-drawn graph is acceptable, but a 1-pt bonus is given for a print-out of a computer-generated graph. Attach the graph to this sheet.

5. Based on your results, do you think a cubic or a logarithmic model is a better fit for this data? Explain why.

Cubic: $R^2 \approx .991$ – The cubic correlation is higher (closer to 1), so it's a better model

Logarithmic: $R^2 \approx .978$