PC
it 1

Name: _____

13-1.14 Modeling and Application

Hour:_____ Date: _____

. The price of Amazon stock fluctuates over time. On December 6, 2019, one share of Amazon stock was \$87.58. The table above gives the price of one share of Amazon stock, in dollars, for selected times t, the number of months after December 6, 2019.

t (months)	0	1	13.5	19	26.5	31.5	35
$A(t)$ (in \$)	87.58	124.15	164.61	185.97	152.60	122.42	90.98

a) Based on the data presented in the table, would a linear, quadratic, or cubic function be most appropriate to model this data? Give a reason for your answer.

quadratic, the slope goes positive, then negative

b) Find the appropriate regression function to model these data.

$A(t) = -.27t^2 + 9.16x$

c) Using the model found in part b, what is the predicted price of one share of Amazon stock when $t = 16$ months (April 6, 2021)?

$A(t) = 177.79$

d) The actual price for one share of Amazon stock on April 6, 2021 ($t = 16$) was \$168.61. What is the residual for this value?

the residual was 9,18

e) What is the residual for January 6, 2020?

it was 14,28

2. In 1988, only 24% of primary care doctors in the UK were women. Since that time, the percentage of female primary care doctors has consistently been increasing. The function F represents the percent of primary care doctors that were women in a given year, where $t = 0$ represents the year 1988. The table gives values for F at selected values of t. The function F can be modeled by the linear regression function $y = at + b$, where a and b are constants.

t (years)	0	4	7	13	17	22	25
$F(t)$ (in %)	23	28	30.5	36	42	47	50

a) Based on the data presented in the table on the previous page, would a linear, quadratic, or cubic function be most appropriate to model this data? Give a reason for your answer.

linear

b) Find the appropriate regression function to model these data.

$\hat{F}(t) = 1.08t + 23.09$

c) Using the model found in part b, what is the predicted percentage of female primary care doctors in the UK for the year 2021 ($t = 33$)?

58.67%

d) In 2021, the women accounted for 55% of all primary care doctors in the UK. What is the residual for this value?

residual is -3.67

3. The Federal Funds Rate is the targeted interest rate that commercial banks use when lending or borrowing money for each other. This rate is set by the US Federal Reserve and had a large impact on the entire population. When the Federal Funds Rate increases, the interest rates banks charge for personal loans, car loans, home mortgages, etc… will also increase. The table gives the Federal Funds Rate, in percent, for selected times t, where t is the number of years since 2018.

t (years)	0	1	2	3	5
$R(t)$ (in %)	1.5	2.5	1.9	0.5	4.5

a) Based on the data presented in the table, would a linear, quadratic, or cubic function be most appropriate to model this data? Give a reason for your answer.

Cubic, it goes up-up, down, then up again

b) Find the appropriate regression function to model these data.

$\hat{R}(t) = .29x^3 - 1.4x^2 + 2.8x + 1.5$

c) Based on the model found in part a, what is the predicted Federal Funds Rate for the year 2026 ($t = 8$)?

~~52~~ 52.3%

d) The highest Federal Fund Rate in US history was 20% in 1980. Based on this information and the answer found in part b, do you think the cubic regression model found in part a is useful in predicting rates into the future? Explain your reasoning.

No, the residual was 32.3 off, the future did not follow the cubic regression.