LESSON 5.4 **Assignment**

Name _____ Date _____

Modeling Gig
Modeling Polynomial Data

1. Kayla has been monitoring the deer population in a wildlife reserve for several years. The table displays the population of deer in the reserve at the beginning of each year since 2000.

Time Since 2000 (years)	Deer Population
0	1110
1	1140
2	1165
3	1190
4	1200
5	1210
6	1215
7	1215
8	1220
9	1230
10	1250
11	1260
12	1290

5

   a. Determine the regression equation that best models the data.

   b. Use your regression equation to predict the deer population at the beginning of the year 2020. Explain your reasoning.

© Carnegie Learning

c. Use your regression equation to predict when the deer population will reach 3000. Explain your reasoning.

d. Use your regression equation to predict the deer population at the beginning of the year 1992. Explain your reasoning.

2. A magazine company is developing a new monthly college basketball magazine. The company conducted a survey to determine the monthly issue price that would generate the maximum amount of income. The table displays the number of probable monthly subscribers based on different prices for a single issue of the magazine.

Issue Price (dollars)	Number of Subscribers	Monthly Sales Income (dollars)
1.50	300,000	
1.75	290,000	
2.00	260,000	
2.25	240,000	
2.50	220,000	
2.75	200,000	
3.00	175,000	
3.25	145,000	
3.50	120,000	

a. Complete the table.

b. Predict the single issue price that will generate the maximum amount of monthly sales income. What monthly sales income can the company expect at that price? Explain your reasoning.

LESSON 5.4 **Assignment**   *page 3*

Name _____ Date _____

3. Mr. Dominguez is trying to determine the amount of nitrogen fertilizer he should apply to his soybean crops in order to achieve the highest soybean production. Last year, he experimented by applying different amounts of fertilizer to several fields. The results of his experiment are displayed in the table.

Nitrogen Fertilizer (pounds per acre)	40	50	60	70	80	90	100	110	120
Soybean Yield (bushels per acre)	52	55	56	59	60	62	61	59	56

a. Determine the regression equation that best models the data. Round decimals to the nearest thousandth.

b. Predict the soybean yield on 1 acre of land with an application of 150 pounds of nitrogen fertilizer. Round decimals to the nearest tenth.

5

c. Predict the soybean yield on 1 acre of land without any application of the nitrogen fertilizer. Round decimals to the nearest tenth.

3

LESSON **5.4**   **Assignment**   *page 4*

   d. When an acre of land produces more than 60 bushels of soybeans, the yield is considered high. Determine the interval(s) of nitrogen fertilizer amounts that result in a high yield. Round decimals to the nearest tenth. Explain your reasoning.

   e. Predict the amount of nitrogen fertilizer Mr. Dominguez should apply to each acre of soybeans in order to achieve the maximum yield. How many bushels of soybeans per acre should Mr. Dominguez expect with that application? Round decimals to the nearest tenth.
Explain your reasoning.

5

   f. How much income can Mr. Dominguez expect to earn on 45 acres of soybeans if he applies the optimum amount of nitrogen fertilizer for the maximum yield and his soybeans sell for $12.30 per bushel? Explain your reasoning.