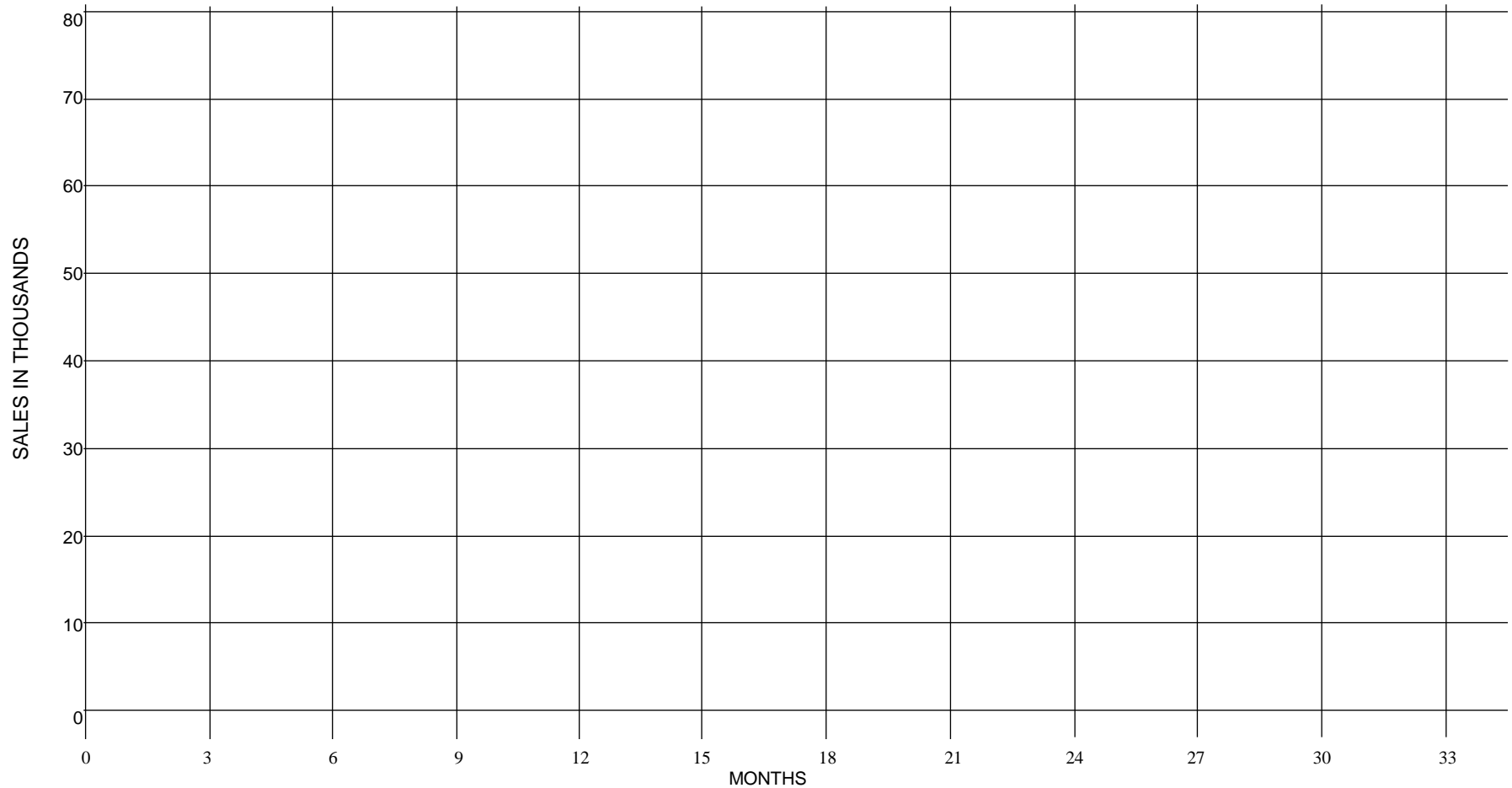


Functional Analysis

SMALL BUSINESS

NET INCOME



NET INCOME DATA

MONTH	INCOME	MONTH	INCOME	MONTH	INCOME	MONTH	INCOME
0	5000	4	6000	12	62500	24	51000
1	1000	5	5500	15	78000	27	45500
2	1000	6	7000	18	79000	30	44000
3	4000	9	31500	21	66000	33	42500

Functional Analysis

SMALL BUSINESS

A small business opened in May selling a unique niche product. Typically, new businesses have a hard time in the market, experiencing cash flow and supply problems, until they get established with a brand appeal. However, niche markets soon become saturated and the “fad” appeal diminishes, resulting in reduced product sales.

When Jahla opened the business, there was no one else in the market, but there was also no brand appeal. Jahla’s business struggled in the first quarter, and almost closed. However, local neighborhood appeal picked up as seen by the sales in the second quarter. Then, Jahla’s business really began to take off. Jahla recorded monthly net income for the first two quarters, and then net quarterly income thereafter.

Jahla would like to model continuous sales from the data above.

1. Graph the data above.
2. What type of curve could be used to model net income close to the maximum value?
 - a. Using the values from the 12th, 15th and 18th months, model the net income of the business.
 - b. For what months is this a good model?
 - c. Based on the model, what was Jahla’s maximum net income?
 - d. When did this maximum income occur?
 - e. According to the model, at what other time did the business have the same net income as the 12th month? Explain mathematically.
3. What type of function could be used to model Jahla’s net income in the last year?
 - a. Using three successive values around 24 months, model the net income.
 - b. For what months is this a good model?
 - c. Based on the model, what is Jahla’s expected net income at three years?
 - d. If this model holds, what could Jahla expect as net income in the future? Explain mathematically.
 - e. Where would the two models have about the same value?
4. Businesses analyze long term results to determine prosperity.
 - a. What is the average rate of change for the first year?
 - b. What is the average rate of change between 18 and 30 months?
 - c. Interpret one of these results in terms of the business context.
 - d. Interpret this same result mathematically.
 - e. According to your models, when did the business have a net income above \$45,000?
5. Each mathematical model has advantages and disadvantages.
 - a. What are the advantages of using a quadratic model to model the data?
 - b. What are the advantages of using an exponential model to model the data?
 - c. What are the advantages of using a linear model to model the data?
 - d. When would you consider using each kind of model?

BONUS

The calculator can create models for data.

- a. Using the same data as above, use the calculator to create a quadratic regression model.
- b. Using the same data as above, use the calculator to create an exponential regression model.