

MTH 30 LECTURE NOTES (Ojakian)

Topic 8: Lines and Linear Functions

OUTLINE

(References: 2.1, 2.2, 2.3, 2.4)

1. Linear Functions
 2. Lines
 3. Applications
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1. Linear Function

DEF: Any function $f(x) = mx + b$.

- (a) Graph is a line.
- (b) Graph by finding 2 points.

2. Intercepts

x and y intercepts

3. Slope

4. Graphing

- (a) From slope and intercept
- (b) As a graph transformation of a line passing through the origin.
- (c) Application. Section 2.1: 1
- (d) Application: Salary plus commission.

5. Parallel vs. Intersecting Lines vs. Perpendicular

- (a) Parallel: same slope
- (b) Perpendicular: $-1/m$ (or negative reciprocal)

6. Intersection Point of Two Lines

- (a) Set functions equal and solve (be aware that there may not be solutions)
- (b) Application Break-even points (Section 2.2 - Example 13)

7. Modeling (section 2.3)

Goal: Relate two quantities by an equation.

Why? - To make predictions!

(meaning, you can determine the independent variable from the dependent variable)

- (a) Modeling by a LINE makes sense when the two quantities are related by a “CONSTANT rate of change”

Example: Relationship of time to distance, when driving at a constant speed.

- (b) Example: Section 2.1: 68

- (c) General approach to developing a model: 2.3 (p. 213)

8. Fitting Linear Models to Data (section 2.4)

- (a) Make a “scatter plot” of the data (like example 1, page 226)

- (b) Does the data look close to a line? If not, use another approach! ...

(See pictures of Section 2.4, Figure 7, page 231)

- (c) Example: Section 2.4 Example 1 (page 226)

- (d) Finding Best Fit Line

- i. Open “Google Sheets”

- ii. Make 2 columns of data where each row is paired data (or do it all horizontally)

- iii. For Scatter Plot:

- Select 2 columns of data (including labels) and do: Insert -- > Chart

- iv. For Best-Fit Line:

- Customize -- > Series -- > Trendline

- v. For Equation:

- Customize -- > Series -- > Label -- > Use Equation

- (e) Now make predictions from the data!

9. Exercises

- (a) Real world.

- Section 2.1: 68 - 70, 74, 75.

- Section 2.3: 9 - 12, 13 - 18, 19 - 24, 25 - 30, 31 - 34, 35 - 38.

- Section 2.3: 45 - 52

- (b) Parallel/Perpendicular. Section 2.2: 18 - 23, 24 - 27

- (c) Break even point.

- Section 2.2: 72 - 76

- Section 2.3: 53 - 58

- (d) Fit Data.

- Section 2.4: 6, 7, 8 - 11, 18 - 21.

- Using Spreadsheet. Section 2.4: 22 - 24, 34 - 42