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!