2-1-2 Activity: Slope

1. If Francine is working at Red Castle and has $33 at 6PM and $78 at 11PM, how much money has Francine earned from 6PM to 11PM (Show units in your calculation)? At what rate is Francine earning money each hour (show units in your calculation)? Be sure to justify the operations you use (meaning and units of slope).

OR

1. Free-Lance Freddy works for constant hourly rates, depending on the job. He also carries some spare cash for lunch. To make his employers sweat, Freddy keeps a meter on his belt telling how much money they currently owe (with his lunch money added in, thus giving the total amount of money he has).
   1. On Monday, 3 hours into his work as a gourmet burger flipper, Freddy’s meter reads $42. 7 hours into his work, his meter reads $86. (Explain why the subtraction 86-42 will result in an amount of money independent of his lunch money)
   2. On Tuesday, Freddy is CEO of the We Say So Company. After 2.53 hours of work, his meter reads $863.15 and after 5.71 hours of work, his meter reads $1349.78. (Explain why the subtraction 1349.78 – 863.15 will result in an amount of money independent of his lunch money)

1. APC p. 46 #3 (skip f(t) part): A report by the US Geological Survey indicates that glaciers in Glacier National Park, Montana, are shrinking. Recent estimates indicate the area covered by glaciers has decreased from over 25.5 km2 in 1850 to about 16.5 km2 in 1995. Let A f (t) give the area (in square km) t years after 2000, and assume f (t) 16.2 − 0.062t.
   * 1. Find and explain the meaning of the slope. Which statement best explains its significance?

⊙ The area covered by glaciers is decreasing by 62, 000 m2 every year.

⊙ The total area covered by glaciers decreased by 16.2 km2 from 1850 to 2000.

⊙ The area covered by glaciers is decreasing by 62 m2 every year.

⊙ The total area covered by glaciers is increasing by 0.062 km2 every year.

⊙ The area covered by glaciers is decreasing by 16.2 km2 every year.

⊙ None of the above

1. APC p. 48 #6 (maybe just parts a, b, d, e)?: An apartment manager keeps careful record of how the rent charged per unit corresponds to the number of occupied units in a large complex. The collected data is shown in Table 1.4.13.³ Monthly Rent $650 $700 $750 $800 $850 $900 Occupied Apartments 203 196 189 182 175 168 Table 1.4.13: Data relating occupied apartments to monthly rent.

a. Why is it reasonable to say that the number of occupied apartments is a linear function of rent?

b. Let A be the number of occupied apartments and R the monthly rent charged (in dollars). If we let A f (R), what is the slope of the linear function f ? What is the meaning of the slope in the context of this question?

c. Determine a formula for A f (R). What do you think is a reasonable domain for the function? Why?

d. If the rent were to be increased to $1000, how many occupied apartments should the apartment manager expect? How much total revenue would the manager collect in a given month when rent is set at $1000?

e. Why do you think the apartment manager is interested in the data that has been collected?

1. APC p. 48-49 #7: Perhaps for 2-1-3? Slope = Acceleration): Alicia and Dexter are each walking on a straight path. For a particular 10-second window of time, each has their velocity (in feet per second) measured and recorded as a function of time. Their respective velocity functions are plotted in Figure 1.4.14. ³This problem is a slightly modified version of one found in Carroll College’s Chapter Zero resource for Active Calculus. 2 4 6 8 10 2 4 6 8 10 t (sec) v (ft/sec) D = g(t) A = f(t) Figure 1.4.14: The velocity functions A f (t) and D 1(t) for Alicia and Damon, respectively. a. Determine formulas for both A f (t) and D 1(t).

b. What is the value and meaning of the slope of A? Write a complete sentence to explain and be sure to include units in your response.

c. What is the value and meaning of the average rate of change of D on the interval [4, 8]? Write a complete sentence to explain and be sure to include units in your response.

d. Is there ever a time when Alicia and Damon are walking at the same velocity? If yes, determine both the time and velocity; if not, explain why.

e. Is it possible to determine if there is ever a time when Alicia and Damon are located at the same place on the path? If yes, determine the time and location; if not, explain why not enough information is provided.

6. S-Z p. 154: . Suppose that two separate temperature readings were taken at the ranger station on the top of Mt. Sasquatch: at 6 AM the temperature was 24◦F and at 10 AM it was 32◦F. 1. Find the slope of the line containing the points (6, 24) and (10, 32). 2. Interpret your answer to the first part in terms of temperature and time. 3. Predict the temperature at noon.

7. ORCCA: p. 177 #49 (and others): A biologist has been observing a tree’s height. Eleven months into the observation, the tree was 16.59 feet tall. Seventeen months into the observation, the tree was 18.33 feet tall. What is the rate at which the tree is growing? In other words, what is the slope if you plotted height versus time?