

Instructions: This homework is an individual effort. Answer each question. This is due on **Wednesday, January 22nd. Show all work to receive full credit.**

1. Ronald McDonald has come to the realization that the burgers he makes are not good for him (So sad :(). Ronald's doctor has done some tests and determined that when Ronald eats 2 burgers in a week his health is 90% of what it could be. However, when Ronald eats 10 burgers in a week, his health is 26% of what it could be. Ronald is worried about this and wants to gain a little more information about it.
 - a. Help Ronald by creating a linear model of the relationship between number of burgers Ronald eats and the percentage of ideal health he has, $H(b)$.
 - b. Determine the y-intercept.
 - c. Interpret the above. Is this reasonable? Why?
 - d. Determine the x-intercept.
 - e. Interpret the above. Is this reasonable? Why?
 - f. Interpret the slope of the model in (a).
 - g. Is the model in (a) increasing or decreasing? Why?
 - h. Suppose that for any number of burgers between the amounts tested that a linear relationship holds. Find the domain and range of the model given this (give both interval and inequality notation).
 - i. Choose any whole number between 3 and 9. Let this number be b . Find and interpret $H(b)$.
 - j. Graph the model from (a) using a solid line for in the domain found above and a dotted line for outside the domain found above. Do not forget to label both axes.
 - k. On the graph created for Ronald, draw a line (no need to worry about domain yet) for yourself when eating 2 and 10 burgers in a week. Explain (Be creative!). Repeat (a) through (i) given your line.

2. Determine if the tables below can be modeled by a linear function or not. Justify your answer.
3. If linear, give a function representing the values in the table.

(a) Table 1.

| | | | | |
|--------|----|----|----|----|
| x | 0 | 2 | 3 | 5 |
| $f(x)$ | 20 | 26 | 29 | 35 |

(b) Table 2.

| | | | | |
|--------|---|------|-------|---------|
| x | 0 | 1 | 2 | 3 |
| $f(x)$ | 7 | 2.24 | .7168 | .229376 |

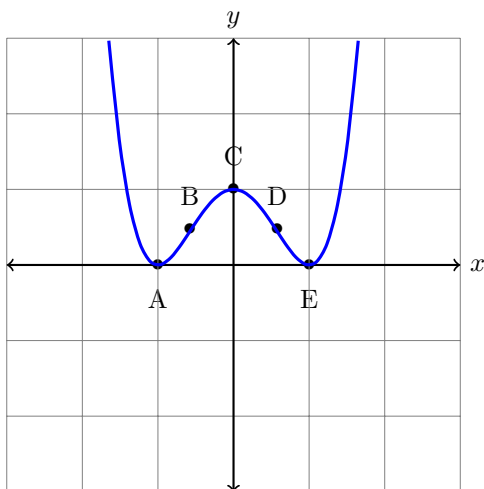
(c) Table 3.

| | | | | |
|--------|----|----|----|----|
| x | 0 | 1 | 2 | 3 |
| $f(x)$ | 28 | 25 | 22 | 20 |

4. Given the graph below where $A = (-1, 0)$, $B = (-\sqrt{3}/3, 38/81)$, $C = (0, 1)$, $D = (\sqrt{3}/3, 38/81)$, and $E = (1, 0)$, find the following:

(a) Find the intervals for which the function is increasing and the intervals for which the function is decreasing and label which are increasing and which are decreasing (Note: Use open brackets for these intervals).

(b) Find the intervals for which the function is concave up and the intervals for which the function is concave down and label which are concave up and which are concave down (Note: Use open brackets for these intervals).



5. A company has really bad financial advisors and decides to fire all of them! They decide to bring you on and ask for you to start with the basics. They tell you that $C(q) = 600 + 13q$ and $R(q) = 25q$. They ask for:
- the cost, revenue, and profit for a quantity of 30 goods and if this is going to result in a profit
 - the profit equation
 - the marginal cost, marginal revenue, and marginal profit equations
 - and the break-even point.
6. A different company brings you on as a financial advisor, but this time they want you to focus on their market. Sales figures show that the company sold 1960 pen sets each week when they were priced at \$1/pen set, and 1800 pen sets each week when they were priced at \$5/pen set. They ask you:
- What is the demand function for the pen sets?
 - Supposing supply is given by $q = 80p + 1520$, what is the market equilibrium price and quantity for us?