

Name: _____

Date: _____

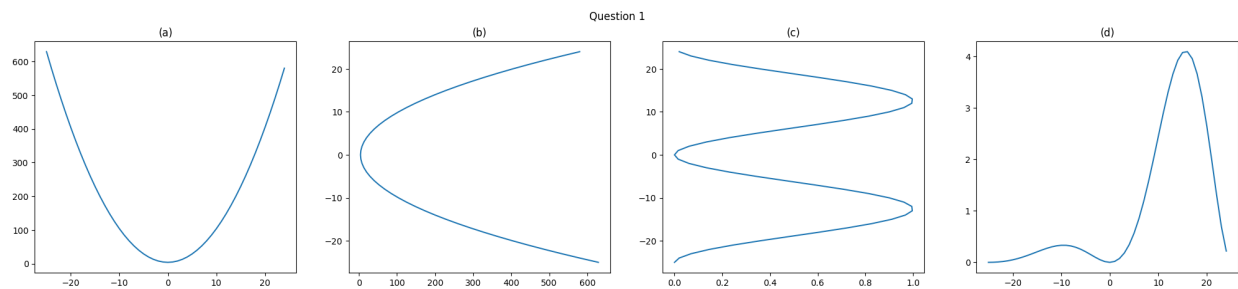
Class: _____

Teacher: _____

Math Mini Quiz 4

This Mini Quiz, we're going to explore the math concepts that you've learned so far in this unit. This assignment should take you about **25 minutes**.

1) Which of the following are functions? Explain how you know for each function



Functions: a, d → Not Functions: b, c

We can tell this by asking the question "does each input (x axis) lead to exactly one output (y axis)." Looking at (b) for example, there are two different y values for many values of x including $x = 300$. This means it is not a function. Looking at (c), the same thing happens for many values of x including $x = 0.6$. However, for (a) and (d), there are no x values for which there are more than one y values.

A train starts 120 miles away from your hometown. It travels at a constant speed (rate of change) of 30 miles per hour until it reaches your city*.

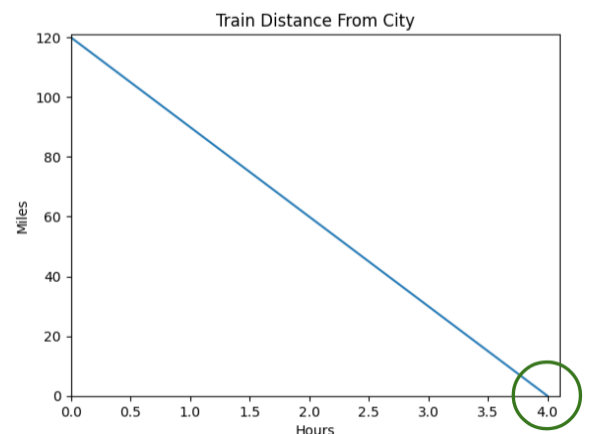
2) Write a function, $d(t)$ for the distance the train is from your city as a function of hours h .

$$d(h) = 120 - 30h$$

3) Graph the equation on the plot on the right. Pay attention to using an appropriate range and domain.

4) After how long does the train arrive in your city? **Circle** the time when the train arrives in your city on the graph.

The train arrives when the distance is zero, so we plug in: $d(h) = 0 = 120 - 30h$. We can then solve for h which gives us $h = 120 / 30 = 4$. So the train will arrive in 4 hours. This is the x-intercept on the graph.



(yes, there's a back, don't forget it)

*note that actually the train would slow down as it approaches, but we are simplifying this problem

A “normal” human body temperature is around 99° F. When you take your body temperature, it may be of interest to calculate how far away you are from this “normal” body temperature you are. The “how far away you are” can be expressed as an *error* function which is an absolute value function like:

$$e(T) = |99 - T|$$

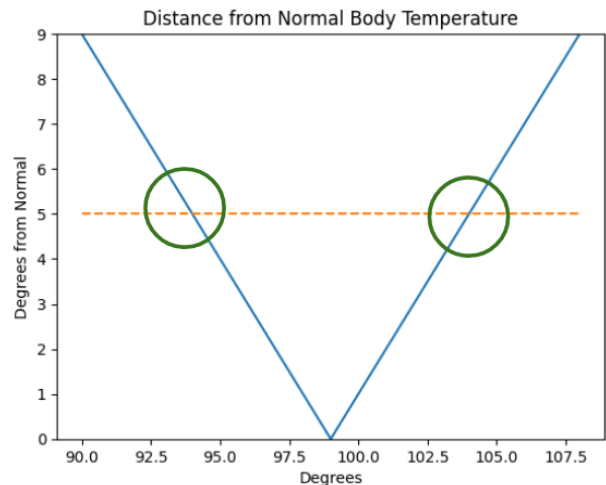
3) Graph this function on the plot to the right for $90 < T < 109$

4) Write this function as a piecewise function.

$$e(T) = \begin{cases} 99 - T & T \leq 99 \\ T - 99 & T > 99 \end{cases}$$

5) What is the minimum value of the error function?

Where does it occur?



The minimum value is 0

It occurs when $T = 99$

This makes sense because this is when there is no error, the temperature is exactly 99 degrees

6) Assume doctors say a difference of more than 5° from the normal temperature is cause for concern.

(a) Draw the horizontal line: $y = 5$. Circle the point(s) where this line intercepts with the function $e(T)$.

(b) What do these interception points tell us?

(c) $e(T)$ and $y = 5$, solve for the temperature at which these intersections occur.

(a) see graph above

(b) these intercept points tell us where we should start to be concerned. At these points the error function becomes greater than 5

(c) we need to check both parts of the piecewise function, so:

$$99 - T = 5$$

$$T = 99 - 5 = 94$$

$$T - 99 = 5$$

$$T = 99 + 5 = 104$$

So these intersections occur at $T = 104$ and $T = 94$. This means 94 or below and 104 and above are cause for concern

The end, good job :)