

Practice Exercises:

Exercise 1: Create a “Table of Values” for each of the toolkit functions using at least 5 values of x . Then construct your own graph. Does your graph resemble the ones in this section? Make sure to select both positive and negative x values *when appropriate* in order to practice calculator operations with negative numbers. [When are negative values of x not appropriate?]

Exercise 2: Given a ball thrown vertically upward according to the formula

$$h(x) = 0.5 + 27.2x - 4.9x^2$$

- A line is **tangent** to the curve at $x = 0.5$ seconds. What is the y coordinate of the point where the tangent line and the curve intersect?
- A line is **secant** to the curve and passes through $(1, \text{_____})$ and $(0, \text{_____})$. What are the y coordinates of the two points?
- Find the slope of the secant line in b)
- Use this number to estimate the speed of the ball at 0.5 seconds.
- Is this a “reliable” estimate, given that the actual speed of the ball is 22.3 meters/second, 0.5 second after being thrown?

Exercise 3: What is the slope of the secant line through the given two points for $y = x^2$, where the two points are

- the point $(3, 9)$ and a second point with $x = 2.97$
- the point $(3, 9)$ and a second point with $x = 3.02$

Use this information to estimate the slope at $x = 3$

Sketch the graph of $y = x^2$ for x between 2 and 4

Exercise 4: What is the slope of the line through the given two points for $y = x^2 + x - 2$, where the two points are

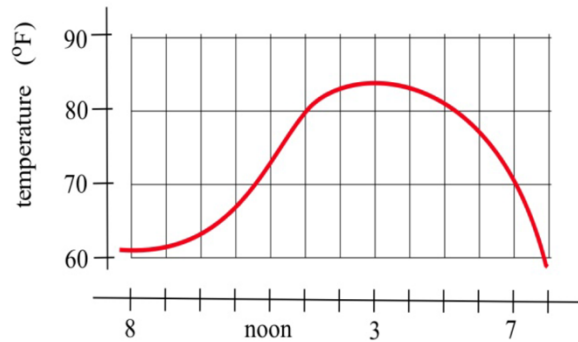
- the point $(2, 4)$ and a second point with $x = 1.97$
- the point $(2, 4)$ and a second point with $x = 2.02$

Use this information to estimate the slope at $x = 2$

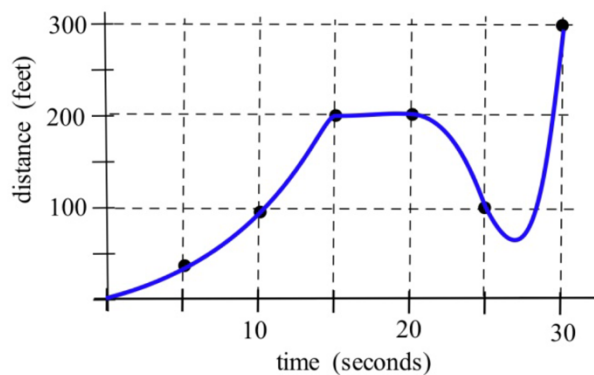
Sketch the graph of $y = x^2 + x - 2$ for x between 1 and 3

Exercise 5: Here we see a temperature graph on a certain day in May in Boston.

- What was the average change in temperature from 9 am to 3 pm?
- Estimate how the temperature was changing (in $\frac{^{\circ}\text{F}}{\text{hour}}$) at 10 am?
- Same question but at 6 pm?



Exercise 6: A person standing at the side of a road was measuring the distance between themselves and a car that was traveling on a straight road.



- Where was the car in relation to the person at the start?
- What are the units of velocity/speed on this graph?
- What was the average velocity of the car from 0 seconds to 30 seconds?
- What was the average velocity of the car from 10 seconds to 25 seconds?
- Estimate how fast the car was traveling at
 - 10 seconds?
 - 18 seconds?
 - 25 seconds? (Hint: slope will be a negative number. To get speed, make it positive)
- What is happening between 15 seconds and 20 seconds?

- g) Velocity is negative, while speed is positive between 20 seconds and about 27 seconds. Why? What does this mean? Hint: Look at how the distance between the car and the observer is changing.

Exercise 7: Fill in the table with appropriate units for $\frac{dy}{dx} = f'(x) = \text{slope}$.

Units for x	Units for y = f(x)	Units for $f'(x)$
hours	miles	
vehicles	people	
dollars	bottles of water	
days	birds (migrating)	
hours	miles per hour	
minutes	gallons	
ounces	dollars	