Problem Set 1: Pre-Calculus

Due: September 4, 2019

Problem 1

Solve for x:

1. $4x + 5 = 17$
2. $13 - 3x = 27x - 2$
3. $0 = x^2 - x - 6$
4. $x^2 = 36$

Problem 2

1. Find the equation of the line that passes through (9,3) and (4,5).
2. Do the lines $y = x$ and $y = x^2 + 3$ intersect? If so, where?
3. Find the distance between $(1, 2)$ and $(-4, -3)$.
4. For the function $f(x) = 3x - x^2$, evaluate $f(-2)$.
5. Plot the polynomial $y = -3 + 2x^2$. For what values of x is this function increasing? Decreasing?

Problem 3

Evaluate:

1. $$\sum_{x=1}^{5} x^2 - x$$
2. $$\sum_{x=0}^{10} (-1)^x (3x + 2)$$
3. $$\sum_{x=1}^{5} 5$$
4. $$\prod_{x=0}^{5} 3x^3 - x$$

5.

$$\prod_{x=1}^{3}(-1)^x(x-2x^2)$$

6.

$$\prod_{x=1}^{5}5$$

Problem 4

Explain in your own words what is meant by the equation

$$\lim_{x\to 2} f(x) = 5$$

Is it possible for this statement to be true and yet have $f(2) = 3$? Explain.

Problem 5

The **greatest** integer function is defined by $\lfloor x \rfloor$ = the largest integer that is less than or equal to x. (For instance, $\lfloor 4 \rfloor = 4$, $\lfloor 4.8 \rfloor = 4$, $\lfloor \pi \rfloor = 3$, $\lfloor \sqrt{2} \rfloor = 1$, $\lfloor -\frac{1}{2} \rfloor = -1$.) Show that $\lim_{x\to 3}\lfloor x \rfloor$ does not exist. Hint: You may want to draw a graph.

Sidenote: The greatest integer function is also called the *floor* function - it just rounds down to the nearest integer. Contrast this with the *ceiling* function, which just rounds up to the nearest integer.

Bonus

Solve for n:

$$\sum_{x=1}^{n}(5x^2-7x+1) = 7871$$