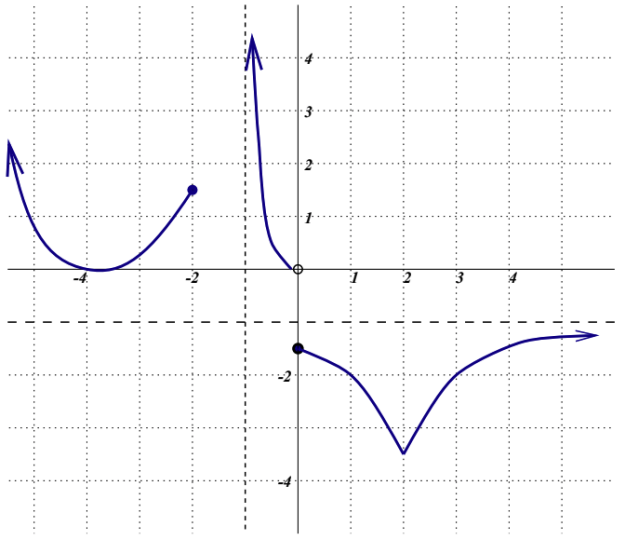
Practice Problems for Math Success

Rates of Change and Behavior of Graphs

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

1. The graph of $f(x)$ is given below. Answer the following questions.



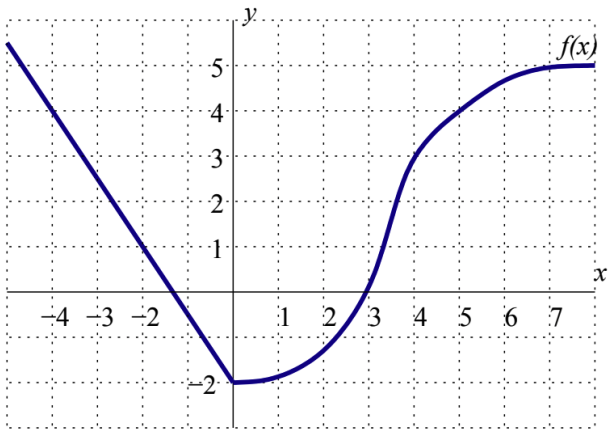
   (a) State all of the intervals in which $f(x)$ is decreasing and positive.

   (b) State all of the intervals in which $f(x)$ is increasing and negative.

   (c) Find the average rate of change between $x = 0$ and $x = 3$.

   (d) Circle the quantity that is greater $\dfrac{f(2) - f(0)}{2}$ or $\dfrac{f(3) - f(1)}{3 - 1}$.

2. The graph of $f(x)$ is given below on the interval $[-4, 4]$.



(a) State all of the intervals in which $f(x)$ is increasing and negative.

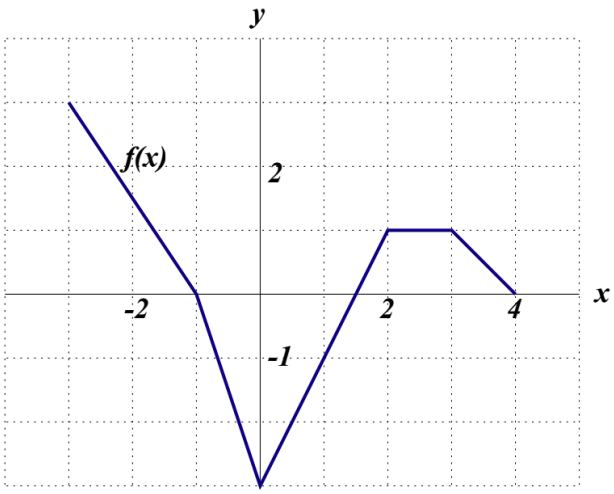
(b) The quantity $\dfrac{f(4) - f(7)}{-3} =$ _____.

(c) What does the quantity $\dfrac{f(4) - f(7)}{-3}$ represent geometrically?

(d) Circle the quantity that is greater $f(5) - f(-4)$ or $f(3) - f(-2)$.

(e) Which quantity is greater? The average rate of change between $x = 3$ and $x = -2$, or The average rate of change between $x = 5$ and $x = -4$.

3. Using the graph below, answer the following questions.



(a) State all of the intervals in which $f(x)$ is increasing and negative.

(b) Find the average rate of change between $x = 1$ and $x = -3$.

(c) On which intervals is the average rate of change negative?

(d) Which quantity is larger, the average rate of change between $x = 3$ and $x = 5$ or the average rate of change between $x = 2$ and $x = 3$?

(e) Find all solutions of $f(x) = 0$.