**Section 5.2: Areas and Distances**

(1) In this section, we expand upon our understanding of finding areas under curves. How do we express the definite integral from $x = a$ to $x = b$ of a function $f(x)$? What is the geometric interpretation of this if $f(x) > 0$, and if $f(x)$ takes on both positive and negative values.

(2) How do we define the definite integral?

(3) Under what conditions does the definite integral exist?

(4) What is the difference between displacement and distanced traveled? How can you find each from the graph of a velocity function?

(5) How can we find the exact value of a definite integral from the graph of the function?

(6) Complete the statement assuming $b$ is a number between $a$ and $c$. Draw a picture to illustrate why it is true.

$$\int_a^b f(x)\,dx + \int_b^c f(x)\,dx =$$

(7) Complete each statement below, then explain geometrically in terms of area under a curve.

(a) $\int_a^b c\,dx =$ where $c$ is any constant.
Explanation:

(b) $\int_a^b [f(x) \pm g(x)]\,dx =$
Explanation:

(c) $\int_a^b cf(x)\,dx =$ where $c$ is any constant.
Explanation:

(d) $\int_b^a f(x)\,dx =$
Explanation:

(e) If $f(x) \geq 0$ for $a \leq x \leq b$, then
Explanation:

(f) If $f(x) \geq g(x)$ for $a \leq x \leq b$, then
Explanation:

(g) If $, \leq f(x) \leq M$ for $a \leq x \leq b$, then
Explanation:

Extra Practice in Book: 5.2: 3, 9, 33, 37, 41, 47, 49, 51, 53, 57