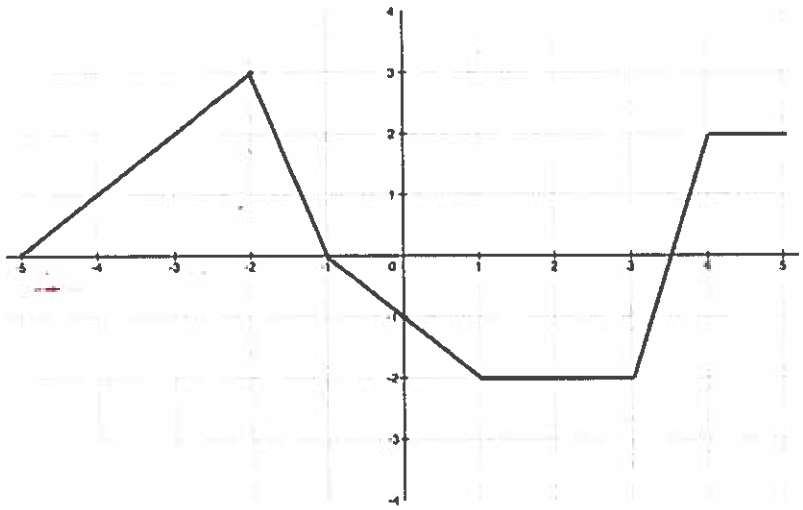
Who's happy there are only 2 chapters left? Key

AP Calculus: 8.1 Definite Integrals with Graphs



Use the graph of $f(x)$ above to answer the questions below.

1. $\int_{-5}^{-1} f(x)\,dx = \boxed{6}$

2. $\int_{-2}^{2} f(x)\,dx = \boxed{-\frac{5}{2}}$

$\frac{3}{2} - 2 - 2 = \frac{3}{2} - \frac{8}{2} = \frac{-5}{2}$

3. $\int_{2}^{5} f(x)\,dx = \boxed{0}$

4. $\int_{-2}^{2} |f(x)|\,dx = \boxed{\frac{11}{2}}$

$\frac{3}{2} + 2 + 2 = \frac{8}{2} + \frac{3}{2} = \frac{11}{2}$

5. $\left|\int_{-2}^{2} f(x)\,dx\right| = \boxed{\frac{5}{2}}$

6. $\left|\int_{-2}^{5} f(x)\,dx\right| = \boxed{\frac{5}{2}}$

$\frac{3}{2} - \cancel{2} - 4 + \cancel{2} = \frac{3}{2} - \frac{8}{2} = -\frac{5}{2}$

7. $\int_{-2}^{5} |f(x)|\,dx = \boxed{\frac{23}{2}}$

$\frac{3}{2} + 2 + 4 + 2 + 2 = \frac{3}{2} + 10 = \frac{3}{2} + \frac{20}{2} = \frac{23}{2}$

8. $\int_{-1}^{1} f(x)\,dx = \boxed{-2}$

9. $\underbrace{\int_{-5}^{-2} f(x)\,dx}_{\frac{9}{2}} + \underbrace{\int_{-2}^{2} f(x)\,dx + \int_{2}^{5} f(x)\,dx}_{-\frac{5}{2}} = \int_{-5}^{5} f(x)\,dx = \boxed{2}$

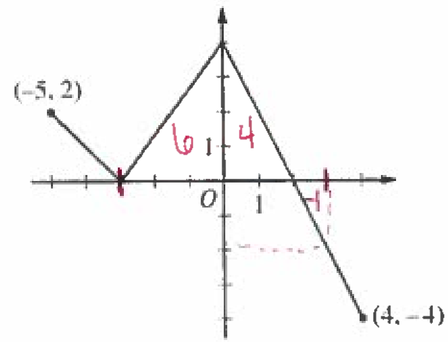
$\frac{9}{2} + -\frac{5}{2} = \frac{4}{2} = 2$

10. $\int_{3}^{-2} f(x)\,dx = -\int_{-2}^{3} f(x) = -\left(-\frac{9}{2}\right) = \boxed{\frac{9}{2}}$

11. $\int_{-5}^{-1} f(x)\,dx = \boxed{6}$

$\frac{3}{2} - 6 = \frac{3}{2} - \frac{12}{2} = \frac{-9}{2}$

Who's happy there are only 2 chapters left?________________________________



Graph of f or g'

3. The function f is defined on the closed interval $[-5, 4]$. The graph of f consists of three line segments and is shown in the figure above. Let g be the function defined by $g(x) = \int_{-3}^{x} f(t)\,dt$.

   (a) Find $g(3)$.

   (b) On what open intervals contained in $-5 < x < 4$ is the graph of g both increasing and concave down? Give a reason for your answer.

   (c) The function h is defined by $h(x) = \frac{g(x)}{5x}$. Find $h'(3)$.

   (d) The function p is defined by $p(x) = f\left(x^2 - x\right)$. Find the slope of the line tangent to the graph of p at the point where $x = -1$.

a) $g(3) = \int_{-3}^{3} f(t)\,dt = 6+4-1 = \boxed{9}$

b) graph of f is a graph of g'

increasing means above x-axis

concave down is when f is decreasing

$\boxed{(-5,-3) \;\&\; (0,2)}$

c) $h'(x) = \frac{5x\,g'(x) - g(x)5}{(5x)^2} = \frac{\cancel{5}(x g'(x) - g(x))}{\cancel{25}_5 x^2} = \frac{x g'(x) - g(x)}{5x^2}$

$h'(3) = \frac{3g'(3) - g(3)}{5(3)^2} = \frac{3(-2)-9}{45} = \frac{-6-9}{45} = \frac{-15}{45} = \boxed{-\frac{1}{3}}$

d) $p'(x) = f'(x^2-x)\cdot(2x-1)$ $\quad p'(-1) = f'(2)(-3) = (-2)(-3) = \boxed{6}$