Name_____ **Date**_____ **Class**_____

Homework 6.4

Given $\int_2^6 f(x)dx = 10$ and $\int_2^6 g(x)dx = -2$, find the values of each of the following definite integrals, if possible, by rewriting the given integral using the properties of integrals.

1. $\int_2^6 [f(x)+g(x)]dx$

$= \int_2^6 f(x)dx + \int_2^6 g(x)dx$

$= 10 + -2$

$= 8$

2. $\int_2^6 [2f(x)-3g(x)]dx$

$= 2\int_2^6 f(x)dx - 3\int_2^6 g(x)dx$

$= 2(10) - 3(-2)$

$= 20 + 6$

$= 26$

3. $\int_2^6 [2x+2g(x)]dx = \int_2^6 2x\,dx + 2\int_2^6 g(x)dx$

$= x^2\Big|_2^6 + 2\cdot(-2)$

$= [6^2 - 2^2] - 4$

$= [36-4] - 4$

$= 28$

Given $\int_{-2}^4 f(x)dx = -6$ and $\int_{-2}^4 g(x)dx = 4$, find the values of each of the following definite integrals. Rewrite the given integral using the properties of integrals. Then, find the value.

4. $\int_{-2}^4 [f(x)+4]dx = \int_{-2}^4 f(x)dx + \int_{-2}^4 4\,dx$

$= -6 + 4x\Big|_{-2}^4$

$= -6 + [4(4) - 4(-2)]$

$= -6 + 16 + 8$

$= 18$

5. $\int_{-2}^4 [3g(x)+x]dx = 3\int_{-2}^4 g(x)dx + \int_{-2}^4 x\,dx$

$= 3\cdot 4 + \frac{1}{2}x^2\Big|_{-2}^4$

$= 12 + [\frac{1}{2}(4)^2 - \frac{1}{2}(-2)^2]$

$= 12 + [\frac{1}{2}(16) - \frac{1}{2}(4)]$

$= 12 + [8-2]$

$= 18$

6. $\int_{-2}^4 \left[\frac{1}{2}f(x)+3x^2\right]dx = \frac{1}{2}\int_{-2}^4 f(x)dx + 3\int_{-2}^4 x^2dx$

$= \frac{1}{2}(-6) + x^3\Big|_{-2}^4$

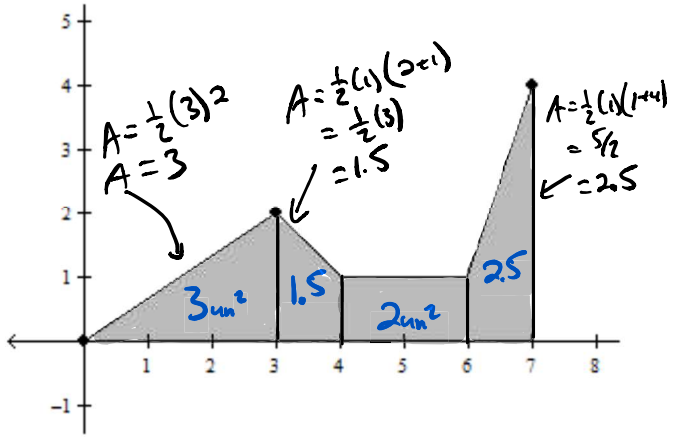
$= -3 + [4^3 - (-2)^3]$

$= -3 + [64 - -8]$

$= 69$

Pictured below is the graph of $f'(x)$, the first derivative of a function $f(x)$. Use the graph to answer the following questions 8 –10.

Graph of $f'(x)$



7. What is the value of $\int_0^7 f'(x)dx$

$= \int_0^3 f'(x)dx + \int_3^4 f'(x)dx + \int_4^6 f'(x)dx + \int_6^7 f'(x)dx$

$= 3 + 1.5 + 2 + 2.5$

$= 9$

8. If $f(0) = -3$, what is the value of $f(3)$?

$\int_0^3 f'(x) = f(x)\Big|_0^3$

$3 = f(3) - f(0)$

$3 = f(3) - (-3)$

$3 = f(3) + 3$

$0 = f(3)$

9. If $f(3) = -1$, what is the value of $f(7)$?

$\int_3^7 f'(x)dx = f(x)\Big|_3^7$

$6 = f(7) - f(3)$

$6 = f(7) - (-1)$

$6 = f(7) + 1$

$5 = f(7)$

The graph of $f'(x)$, the derivative of a function, $f(x)$, is pictured below on the interval $[-2, 6]$. Write and find the value of a definite integral to find each of the indicated values of $f(x)$ below. Also, $f(-2) = 5$.

10. Find the value of $f(0)$.

$\int_{-2}^0 f'(x) = f(x)\Big|_{-2}^0$

$4 = f(0) - f(-2)$

$4 = f(0) - (5)$

$9 = f(0)$

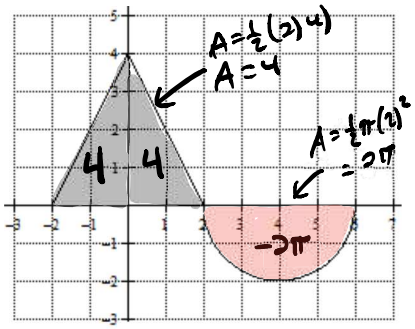
11. Find the value of $f(6)$.

$\int_{-2}^6 f'(x)dx = f(x)\Big|_{-2}^6$

$8 - 2\pi = f(6) - f(-2)$

$8 - 2\pi = f(6) - (5)$

$13 - 2\pi = f(6)$



Graph of f'

$A_6 = \pi r^2$

$= \pi(2)^2$

$= 4\pi$