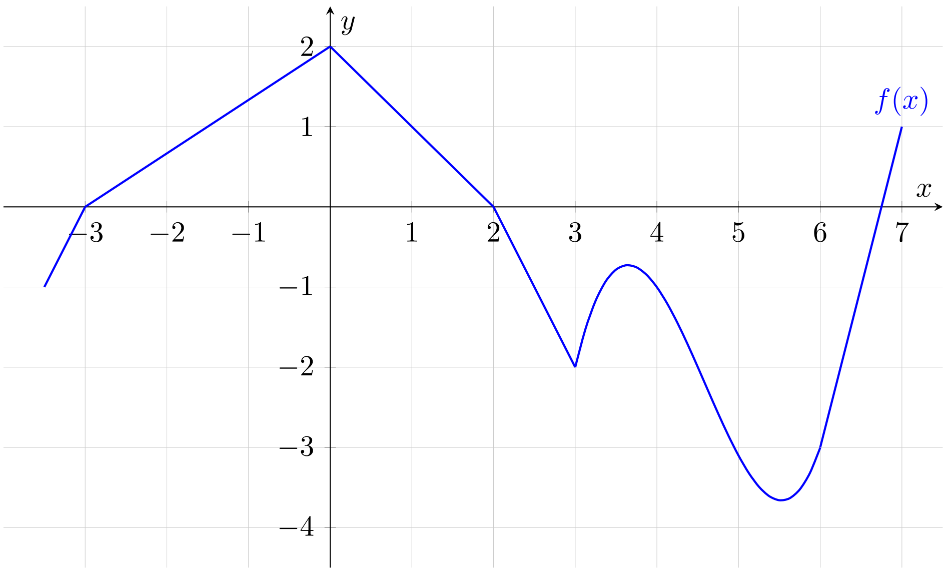
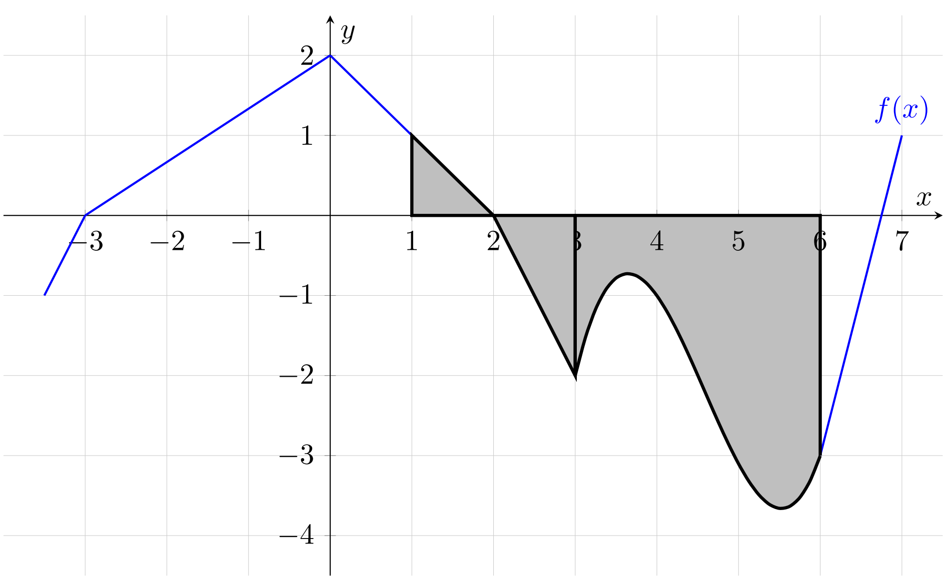
Quiz

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit!

1. (5 points) Given the graph $y = f(x)$ below, if $\int_3^6 f(x)dx = A$, write the integral $\int_1^6 2f(x)dx$ in terms of A.



Solution:



By noting that

$$\int_1^6 2f(x)\ dx = 2\int_1^2 f(x)\ dx + 2\int_2^3 f(x)\ dx + 2\int_3^6 f(x)\ dx.$$

Using geometric properties we can find that

$$\int_1^2 f(x)dx = \frac{1}{2}(1)(1) = \frac{1}{2} \text{ and } \int_1^2 f(x)dx = -\frac{1}{2}(1)(2) = -1.$$

Thus,

$$\int_1^6 2f(x)\ dx = 2\left(\frac{1}{2}\right) + 2(-1) + 2A = \boxed{\text{2A-1}}.$$

2. (5 points) Suppose $\int_0^9 f(x)\ dx = -3$, $\int_4^9 f(x)\ dx = 1$. Find $\int_4^0 \Big(f(x) - 1\Big)\ dx$.

Solution: To find that integral we will use the following three properties

$$\int_a^b (f(x) \pm g(x))\ dx = \int_a^b f(x)\ dx \pm \int_a^b g(x)\ dx,$$

$$\int_a^b f(x)\ dx = -\int_b^a f(x)\ dx,$$

and

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

Thus, using them we obtain

$$\begin{aligned}
\int_4^0 \Big(f(x) - 1\Big)\ dx &= -\int_0^4 \Big(f(x) - 1\Big)\ dx \\
&= \int_0^4 \Big(1 - f(x)\Big)\ dx \\
&= \int_0^4 1\ dx - \int_0^4 f(x)\ dx \\
&= 1 \cdot (4 - 0) - \left(\int_0^9 f(x)\ dx - \int_4^9 f(x)\ dx\right) \\
&= 4 - (-3 - 1) \\
&= 4 + 4 = \boxed{8}.
\end{aligned}$$

Name: ____

Section (circle one): 021 022 023 024

Question:	1	2	Total
Points:	5	5	10
Score:			