Name: Richard

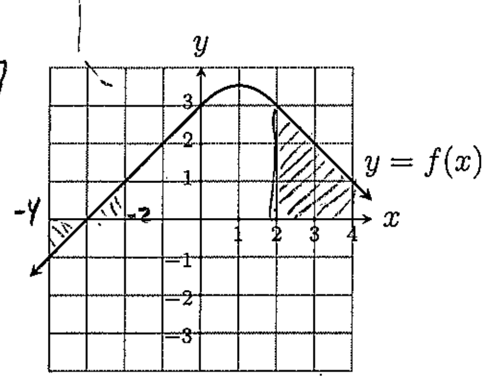
QUIZ 23

MATH 200
November 19, 2024

1. Answer the questions about the function $f(x)$ graphed below.

(a) $\int_2^4 f(x)\,dx = A_{up} = \boxed{4}$

(b) $\int_{-4}^{-2} f(x)\,dx = A_{up} - A_{down} = \frac{1}{2} - \frac{1}{2} = \boxed{0}$



(c) $\int_3^3 f(x)\,dx = \boxed{0}$

(d) Suppose $\int_0^2 f(x)\,dx = 6.6$. Find $\int_0^4 f(x)\,dx$.

$$\int_0^4 f(x)\,dx = \int_0^2 f(x)\,dx + \int_2^4 f(x)\,dx = 6.6 + 4 = \boxed{10.6}$$

(e) $\lim_{n\to\infty} \sum_{k=1}^{n} f\left(-3 + \frac{k}{n}\right)\frac{1}{n} = \lim_{n\to\infty} \sum_{K=1}^{n} f(x_k)\Delta x = \int_{-3}^{-2} f(x)\,dx = \boxed{\frac{1}{2}}$

$a = -3$

$b = -3 + \frac{n}{n} = -2$

$\Delta x = \frac{-2-(-3)}{n} = \frac{1}{n}$ $\quad x_k = -3 + k \cdot \frac{1}{n}$

2. Suppose for functions f and g we have: $\int_1^4 f(x)\,dx = 1$, $\int_4^6 f(x)\,dx = 2$, $\int_1^6 g(x)\,dx = 3$.

Find $\int_1^6 (f(x) + 2g(x))\,dx$

$$= \int_1^6 f(x)\,dx + 2\int_1^6 g(x)\,dx = \int_1^4 f(x)dx + \int_4^6 f(x)dx + 2\int_1^6 g(x)dx$$

$$= 1 + 2 + 2 \cdot 3 = \boxed{9}$$

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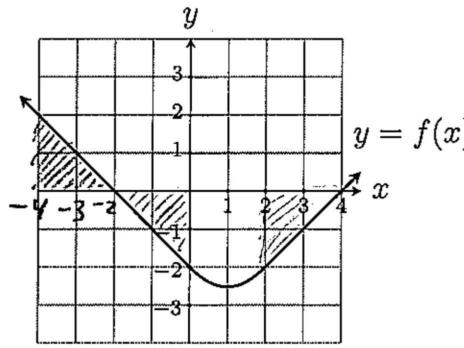
1. Answer the questions about the function $f(x)$ graphed below.



(a) $\int_{-4}^{-2} f(x)\,dx = A_{up} = \frac{1}{2} 2\cdot 2 = \boxed{2}$

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

(c) $\int_{-3}^{0} f(x)\,dx = A_{up} - A_{down} = \frac{1}{2} - 2 = \boxed{-\frac{3}{2}}$

(d) Suppose $\int_{1}^{2} f(x)\,dx = -2.3$. Find $\int_{1}^{4} f(x)\,dx$.

$$\int_1^4 f(x)\,dx = \int_1^2 f(x)\,dx + \int_2^4 f(x)\,dx = -2.3 - 2 = \boxed{-4.3}$$

(e) $\lim_{n\to\infty} \sum_{k=1}^{n} f\left(-4 + \frac{2k}{n}\right)\frac{2}{n} = \lim_{n\to\infty} \sum_{k=1}^{n} f(x_k)\Delta x = \int_{-4}^{-2} f(x)\,dx = \boxed{2}$

$a = -4$
$b = -4 + \frac{2n}{n} = -2$
$\Delta x = \frac{-2-(-4)}{n} = \frac{2}{n}, \quad x_k = -4 + k\frac{2}{n}$

2. Suppose for functions f and g we have: $\int_1^7 f(x)\,dx = 4$, $\int_7^9 f(x)\,dx = 5$, $\int_1^9 g(x)\,dx = 6$.

Find $\int_1^9 (f(x) - 3g(x))\,dx$

$$= \int_1^9 f(x)\,dx - 3\int_1^9 g(x)\,dx = \int_1^7 f(x)\,dx + \int_7^9 f(x)\,dx - 3\int_1^6 g(x)\,dx$$

$$= 4 + 5 - 3\cdot 6$$

$$= 9 - 18 = \boxed{-9}$$