Properties of Definite Integrals - Answer Key

1. If
$$\int_{3}^{7} (f(x) - 4x) dx = 17$$
, find $\int_{3}^{7} f(x) dx$.
Ans: 97

2. If
$$\int_{-1}^{2} f(x)dx = a$$
 and $\int_{-1}^{2} g(x)dx = b$, find
$$\int_{-1}^{2} (2f(x) - 3g(x) + 5)dx.$$
Ans: $2a - 3b + 8$

3. If
$$\int_{-a}^{a} f(x)^2 dx = 9$$
 and $\int_{-a}^{a} g(x)^2 dx = 5$,

find
$$\int_{-a}^{a} (f(x) + g(x))^2 dx$$
.

Ans: The limit cannot be determined.

4. If
$$g(x)$$
 is an odd function and
$$\int_{-2}^{4} (2g(x) + 3x) dx = 15, \text{ find } \int_{2}^{4} g(x) dx.$$
Ans: $\frac{-3}{2}$

5. If
$$f(x)$$
 is even and
$$\int_{-2}^{0} f(x)dx = \alpha,$$
$$\int_{2}^{5} f(x)dx = -1, \text{ find } \left(\int_{-2}^{5} f(x)dx\right)^{2}.$$

Ans:
$$4\alpha^2 - 4\alpha + 1$$

6. Find the average value of
$$f(x) = \sqrt{9-x^2}$$
 on $(-3,3)$.

Ans:
$$\frac{3\pi}{4}$$

7. Find
$$\int_0^4 f(x)dx$$
 if $f(x)$ is even and $g(x)$ is odd and $\int_{-4}^4 (2f(x) + 3g(x))dx = 16$.

8. Is
$$f(x)$$
 an even or odd function so that
$$\int_{-b}^{a} f(x)dx = -\int_{b}^{-a} f(x)dx$$
 if true?

9. Find the average value of
$$f(x) = 5x^5$$
 on $[-8, 8]$.

10. If
$$1 \le f(x) \le 2x$$
 for $0 < x < 4$, find the bounds on average value of $f(x)$ on $[0,4]$.

Ans:
$$1 \le \text{Average value} \le 4$$

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