Math 261 - Lab 20 **Properties of Definite Integrals** **Name:** _____

1. Assume that $\int_2^5 2f(x)dx = 6$, $\int_{-1}^2 f(x)dx = 11$, $\int_{-1}^5 g(x)dx = 8$, and $\int_2^5 g(x)dx = 3$. Find

   (a) $\int_2^5 f(x)dx$

   (b) $\int_{-1}^5 f(x)dx$

   (c) $\int_5^2 g(x)dx$

   (d) $\int_{-1}^2 g(x)dx$

   (e) $\int_2^5 [3f(x) - 2g(x)]\,dx$

   (f) $\int_{-1}^5 \left(\frac{g(x) - f(x)}{7}\right) dx$

   (g) Assume f and g are continuous on $[-1, 5]$. Find the average value of $2g + f$ on $[-1, 5]$.

2. If $\int_{-1}^3 g(x)dx = \frac{\pi}{2}$, find each of the following.

   (a) $\int_3^{-1} g(x)dx$

   (b) $\int_{-1}^3 6g(t)dt$

   (c) $\int_{-1}^3 -g(x)dx$

   (d) $\int_{-1}^3 \frac{2g(x)}{\pi}dx$

3. Graph each integrand and use the geometric area to evaluate each definite integral.

(a) $\int_{-1}^{3} (3x+5)\ dx$

(b) $\int_{-2}^{2} 5+\sqrt{4-x^2}\ dx.$

4. Given that $\int_a^b c\ dx = c(b-a)$, $\int_a^b x\ dx = \frac{b^2}{2} - \frac{a^2}{2}$, and $\int_a^b x^2\ dx = \frac{b^3}{3} - \frac{a^3}{3}$, evaluate the following integrals.

(a) $\int_2^{\sqrt{5}} x\ dx$

(b) $\int_3^{\frac{7}{2}} 12t^2\ dt$

(c) $\int_3^5 x^2 - 3x + 7\ dx$

(d) $\int_0^{\sqrt{2}} u - \sqrt{2}\ du$