

**Practice with Integration**

For #1 and #2, just express the limit as an integral. You do not need to compute the integral.

1.  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left( \left( \frac{3}{n}i - 2 \right)^2 + 1 \right) \cdot \frac{3}{n}$

2.  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \cos \left( \frac{\pi}{n}i + \pi \right) \cdot \frac{\pi}{n}$

3.  $\int_{-2}^1 4dx =$

6.  $\int_{-3}^3 \sqrt{9 - x^2} dx =$

4.  $\int_{\sqrt{2}}^{\sqrt{18}} \sqrt{2} dr =$

7.  $\int_{-2}^1 |x| dx =$

5.  $\int_{-2}^4 \left( \frac{x}{2} + 3 \right) dx =$

8.  $\int_{-1}^1 (2 - |x|) dx =$

$$9. \int_{-1}^1 (1 + \sqrt{1 - x^2}) \, dx =$$

$$10. \int_a^{2a} x \, dx = \quad \text{where } a > 0$$

It can be shown that  $\int_0^1 x^3 \, dx = \frac{1}{4}$ . Using this fact and your knowledge of integration and function transformations, make graphs of the following ten functions and use your graph to determine the integral.

$$11. \int_{-1}^1 x^3 \, dx$$

$$16. \int_{-1}^2 (|x| - 1)^3 \, dx$$

$$12. \int_2^3 (x - 2)^3 \, dx$$

$$17. \int_0^2 \left(\frac{x}{2}\right)^3 \, dx$$

$$13. \int_0^1 (x^3 + 3) \, dx$$

$$18. \int_{-8}^8 x^3 \, dx$$

$$14. \int_{-1}^1 |x|^3 \, dx$$

$$19. \int_0^1 (x^3 - 1) \, dx$$

$$15. \int_0^1 (1 - x^3) \, dx$$

$$20. \int_0^1 \sqrt[3]{x} \, dx$$