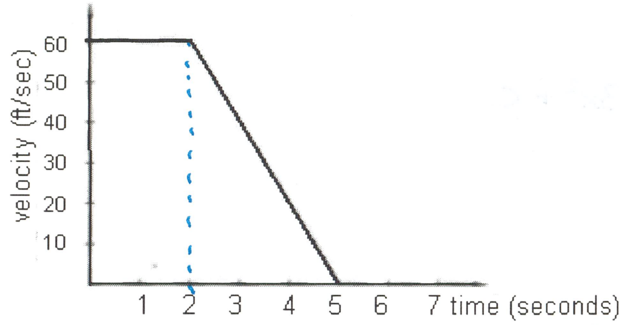
Advanced Math **Chapter 15B Integrals Review** Name Key

1. Find the distance traveled by a stunt driver being filmed for a chase scene. (Do not estimate!)

$2(60) + \frac{1}{2}(3)(60)$

$\boxed{210 \text{ ft.}}$

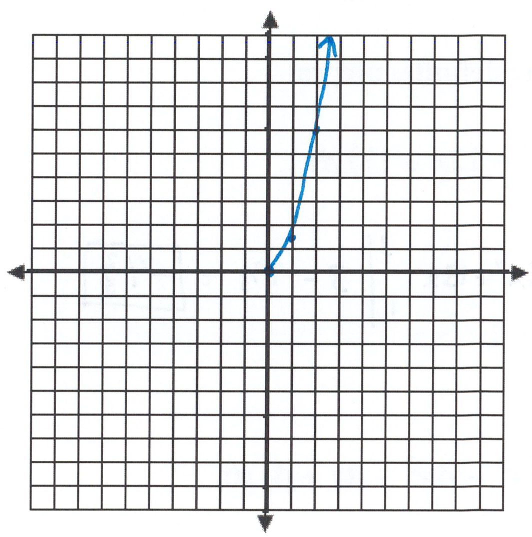


2. Given the velocity function $f(x) = 1.5x^2$ in the interval $0 \le x \le 9$. Use Riemann Sums to estimate $\sum_{i=1}^{3} f(z_i)\Delta x$ where z_i is the left endpoint of the i^{th} subinterval. (Hint: Sketch a graph of the situation).

$\frac{9}{3} = 3$

x	y
0	0
3	13.5
6	54

$3(0 + 13.5 + 54) = \boxed{202.5}$



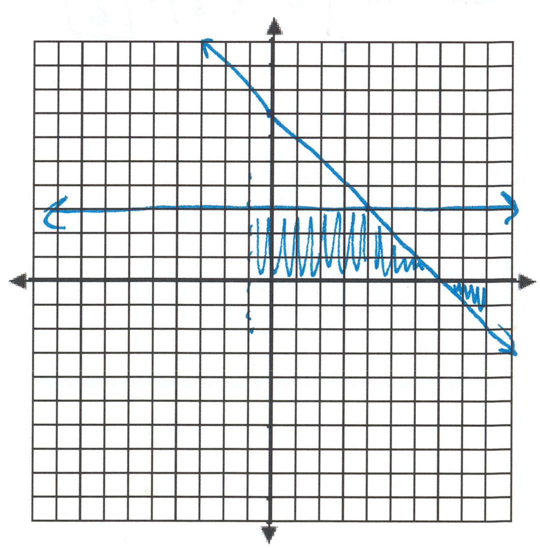
3. $\int_{-1}^{4} (3)dx + \int_{4}^{9} (-x+7)dx$

a. Sketch a picture that represents the given definite integral.
b. Evaluate the integral.

$3x \Big|_{-1}^{4} \quad 12 - {}^-3 = 15$

$\frac{-x^2}{2} + 7x \Big|_{4}^{9} \quad 22.5 - 20 = 2.5$

$15 + 2.5 = \boxed{17.5}$



Evaluate the indefinite integral.

4. $\int (12x^5 - 6x)\,dx$

$2x^6 - 3x^2 + C$

5. $\int (20x^3 + 4x)\,dx$

$5x^4 + 2x^2 + C$

6. $\int (12x^5 - 4x)\,dx$

$2x^6 - 2x^2 + C$

7. $\int (24x^5 + 1)\,dx$

$4x^6 + x + C$

Evaluate the definite integral.

8. $\int_1^3 (2x^2 - 12x + 13)\,dx$

$\frac{2x^3}{3} - 6x^2 + 13x \Big|_1^3 \quad 3 - 7\tfrac{2}{3} = \boxed{-4\tfrac{2}{3}}$

9. $\int_0^3 (-x^3 + 3x^2 - 2)\,dx$

$-\frac{x^4}{4} + x^3 - 2x \Big|_0^3 \quad \frac{3}{4} - 0 = \boxed{\frac{3}{4}}$

10. $\int_{-1}^0 (x^5 - 4x^3 + 4x + 4)\,dx$

$\frac{x^6}{6} - x^4 + 2x^2 + 4x \Big|_{-1}^0 \quad 0 - \left(-\frac{17}{6}\right) = \boxed{\frac{17}{6}}$

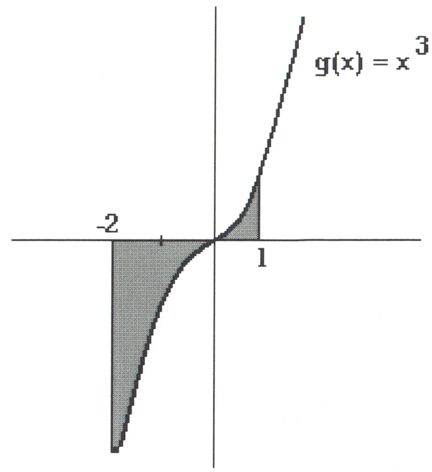
11. $\int_{-3}^0 4x^{\frac{1}{3}}\,dx$

$\frac{4x^{4/3}}{\frac{4}{3}}$

$\frac{12x^{4/3}}{4}$

$3x^{4/3} \Big|_{-3}^0 \quad 0 - 12.98 = \boxed{-12.98}$

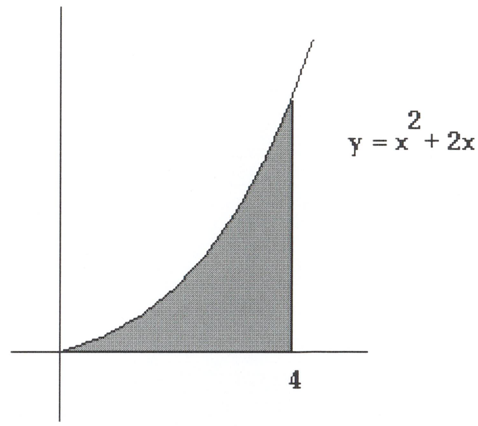
12. Consider the function graphed at the right.
a. Express the area of the shaded region using integral notation.
b. Use the Fundamental Theorem of Calculus to evaluate the integral in part *a*.



$$\int_{-2}^{1} x^3\,dx$$

$$\frac{x^4}{4}\Big|_{-2}^{1} \quad \frac{1}{4} - 4 = \boxed{-3.75}$$

13. Consider the function graphed at the right.
a. Express the area of the shaded region using integral notation.
b. Evaluate the integral.

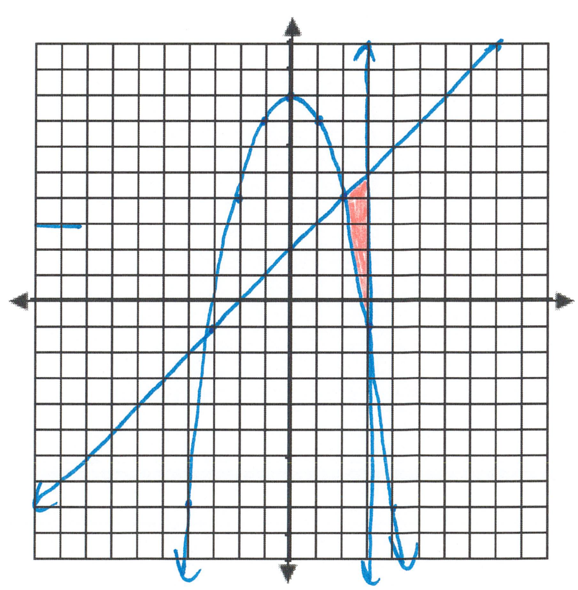


$$\int_{0}^{4} x^2+2x\,dx$$

$$\frac{x^3}{3}+x^2\Big|_{0}^{4} \quad \frac{112}{3} - 0 = \boxed{37.\overline{3}}$$

14. Find the area of the region bounded by $f(x) = -x^2 + 8$, $f(x) = x + 2$, and the line $x = 3$. **Show integral setup!**

$$\int_{2}^{3} x+2\,dx \quad - \quad \int_{2}^{3} -x^2+8\,dx$$



$$\frac{x^2}{2}+2x\Big|_{2}^{3} = 10.5 - 6 = 4.5$$

$$\frac{-x^3}{3}+8x\Big|_{2}^{3} = 15 - 13.\overline{3} = 1.\overline{6}$$

$$4.5 - 1.\overline{6} = \boxed{2.8\overline{3}}$$