Exercise set (4.6):

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5, 6, 7, 8, 9(a), 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 47(a), 49,
50, 53(a,b), 54(a,b). p. 251 - 252

5–8 Find the area under the curve $y = f(x)$ over the stated interval.

5. $f(x) = x^3;\ [2, 3]$

6. $f(x) = x^4;\ [-1, 1]$

7. $f(x) = 3\sqrt{x};\ [1, 4]$

8. $f(x) = x^{-2/3}$; $[1, 27]$

9–10 Find all values of x^* in the stated interval that satisfy Equation (8) in the Mean-Value Theorem for Integrals (4.6.2), and explain what these numbers represent.

9. (a) $f(x) = \sqrt{x}$; $[0, 3]$

9–10 Find all values of x^* in the stated interval that satisfy Equation (8) in the Mean-Value Theorem for Integrals (4.6.2), and explain what these numbers represent. ■

10. (a) $f(x) = \sin x;\ [-\pi, \pi]$

(b) $f(x) = 1/x^2;\ [1, 3]$

11–22 Evaluate the integrals using Part 1 of the Fundamental Theorem of Calculus. ■

11. $\int_{-2}^{1} (x^2 - 6x + 12)\, dx$

12. $\int_{-1}^{2} 4x(1 - x^2)\,dx$

13. $\int_1^4 \frac{4}{x^2}\,dx$

14. $\int_1^2 \frac{1}{x^6}\,dx$

15. $\int_4^9 2x\sqrt{x}\,dx$

16. $\displaystyle\int_1^4 \frac{1}{x\sqrt{x}}\,dx$

17. $\displaystyle\int_{-\pi/2}^{\pi/2} \sin\theta\,d\theta$

18. $\displaystyle\int_0^{\pi/4} \sec^2 \theta \, d\theta$

19. $\displaystyle\int_{-\pi/4}^{\pi/4} \cos x \, dx$

20. $\displaystyle\int_0^{\pi/3} (2x - \sec x \tan x)\, dx$

47. Define $F(x)$ by

$$F(x) = \int_1^x (3t^2 - 3)\, dt$$

(a) Use Part 2 of the Fundamental Theorem of Calculus to find $F'(x)$.

49–52 Use Part 2 of the Fundamental Theorem of Calculus to find the derivatives. ■

49. (a) $\dfrac{d}{dx}\displaystyle\int_1^x \sin(t^2)\,dt$ (b) $\dfrac{d}{dx}\displaystyle\int_1^x \sqrt{1-\cos t}\,dt$

50. (a) $\dfrac{d}{dx}\displaystyle\int_0^x \frac{dt}{1+\sqrt{t}}$ (b) $\dfrac{d}{dx}\displaystyle\int_2^x \frac{dt}{t^2+3t-4}$

53. Let $F(x) = \int_4^x \sqrt{t^2 + 9}\, dt$. Find

(a) $F(4)$ (b) $F'(4)$

54. Let $F(x) = \displaystyle\int_0^x \frac{\cos t}{t^2 + 3t + 5}\, dt$. Find

(a) $F(0)$ (b) $F'(0)$ (c) $F''(0)$.