Section 14.7

R-36

8. $\int_4^1 (2t - 3t^2)\,dt$

$-\int_1^4 (2t - 3t^2)\,dt = -\left[t^2 - t^3\right]\Big|_1^4 = -\left(4^2 - 4^3 - (1-1)\right)$

$= -(16 - 64)$

$= -(-48)$

$= 48$

18. $\int_1^8 \left(x^{1/3} - x^{-1/3}\right) dx = \left[\frac{3}{4}x^{4/3} - \frac{3}{2}x^{2/3}\right]\Big|_1^8$

$\int x^{1/3}\,dx = \frac{3}{4}x^{4/3} + c$

$\int x^{-1/3}\,dx = \frac{3}{2}x^{2/3} + c$

$\left[\frac{3}{4}x^{4/3} - \frac{3}{2}x^{2/3}\right]\Big|_1^8 = \frac{3}{4}(8)^{4/3} - \frac{3}{2}(8)^{2/3} - \left(\frac{3}{4}(1)^{4/3} - \frac{3}{2}(1)^{2/3}\right)$

$= 12 - 6 - \left(\frac{3}{4} - \frac{3}{2}\right)$

$= 6 + \frac{3}{4} = \frac{27}{4}$

24. $$\int_2^{e+1} \frac{1}{x-1}\,dx$$

$u = x-1$
$du = dx$

x	u
2	1
$e+1$	e

$$\int_1^e \frac{1}{u}\,du = \ln|u| \Big|_1^e$$

$$= \cancel{\ln}(e)^{1} - \cancel{\ln}(1)^{0}$$

$$= 1 - 0 = 1$$

$u = (2) - 1$
$u = 1$
$u = (e+1) - 1$
$u = e$

26. $$\int_0^1 (3x^2 + 4x)(x^3 + 2x^2)^4\,dx$$

$u = x^3 + 2x^2$
$du = (3x^2 + 4x)\,dx$

x	u
0	0
1	3

$u = 0^3 + 2(0)^2 = 0$
$u = (1)^3 + 2(1)^2 = 3$

$$\int_0^3 u^4\,du = \frac{u^5}{5}\Big|_0^3 = \frac{3^5}{5} - \frac{0^5}{5} = \frac{243}{5}$$

43. $$\int_0^2 f(x)\,dx \quad ; \quad f(x) = \begin{cases} 4x^2 & 0 \le x < 1/2 \\ 2x & 1/2 \le x \le 2 \end{cases}$$

$$\int_0^2 f(x)\,dx = \int_0^{1/2} f(x)\,dx + \int_{1/2}^2 f(x)\,dx$$

$$= \int_0^{1/2} 4x^2\,dx + \int_{1/2}^2 2x\,dx$$

$$\int_0^{1/2} 4x^2 dx + \int_{1/2}^{2} 2x\,dx$$

$$\left[\frac{4}{3}x^3\right]\Big|_0^{1/2} + \left[x^2\right]\Big|_{1/2}^{2}$$

$$\frac{4}{3}(1/2)^3 + (2)^2 - \left[\left(\frac{1}{2}\right)^2\right]$$

$$\frac{4}{3}\cdot\frac{1}{8} + 4 - \frac{1}{4}$$

$$\frac{1}{6} + \frac{16-1}{4} = \frac{1}{6} + \frac{15}{4} = \frac{4+90}{24} = \frac{94}{24} = \frac{47}{12}$$

59.

$$\frac{dc}{dq} = 0.2q + 8$$

determinar el Costo de incrementar la producción de 65 a 75 und.

$$\int c'dq = \int 0.2q + 8\,dq$$

$$C = \frac{0.2}{2}q^2 + 8q + C$$

$$\int_{65}^{75} C'\,dq = \frac{0.2}{2}q^2 + 8q\,\Big|_{65}^{75} = 0.1(75)^2 + 8(75) - \left[0.1(65)^2 + 8(65)\right]$$

$$= 220$$

El Costo de incrementar la producción es de \$220.

60.

$$\frac{dc}{dq} = 0.004q^2 - 0.5q + 50$$

y la producción aumenta de 90 a 180 und.

$$\int c' dq = \int 0.004q^2 - 0.5q + 50 \, dq$$

$$= \frac{0.004}{3} q^3 - \frac{0.5}{3} q^2 + 50q + c$$

$$\int_{90}^{180} c' dq = \left[\frac{0.004}{3} q^3 - 0.25q^2 + 50q \right] \Big|_{90}^{180}$$

$$= \frac{0.004}{3}(180)^3 - 0.25(180)^2 + 50(180) - \left[\frac{0.004}{3}(90)^3 - 0.25(90)^2 + 50(90) \right]$$

$$= 5229$$

El Costo de incrementar la producción es de \$5229