Section 4.8 Solutions

4.8.11 The antiderivatives of $5x^4$ are $x^5 + C$. Check: $\frac{d}{dx}(x^5 + C) = 5x^4$.

4.8.13 The antiderivatives of $\sin 2x$ are $-(1/2)\cos 2x + C$. Check: $\frac{d}{dx}(-\frac{1}{2}\cos 2x + C) = \sin 2x$.

4.8.15 The antiderivatives of $3\sec^2 x$ are $3\tan x + C$. Check: $\frac{d}{dx}(3\tan x + C) = 3\sec^2 x$.

4.8.17 The antiderivatives of $-2/y^3 = -2y^{-3}$ are $y^{-2} + C$. Check: $\frac{d}{dy}(y^{-2} + C) = -2y^{-3}$.

4.8.19 $\int(3x^5 - 5x^9)\,dx = 3 \cdot \frac{x^6}{6} - 5 \cdot \frac{x^{10}}{10} + C = \frac{1}{2}x^6 - \frac{1}{2}x^{10} + C$. Check: $\frac{d}{dx}(\frac{1}{2}x^6 - \frac{1}{2}x^{10} + C) = 3x^5 - 5x^9$.

4.8.21 $\int \left(4\sqrt{x} - \frac{4}{\sqrt{x}}\right)\,dx = \int(4x^{1/2} - 4x^{-1/2})\,dx = 4 \cdot \frac{x^{3/2}}{3/2} - 4 \cdot \frac{x^{1/2}}{1/2} + C = \frac{8}{3}x^{3/2} - 8x^{1/2} + C$. Check: $\frac{d}{dx}(\frac{8}{3}x^{3/2} - 8x^{1/2} + C) = 4\sqrt{x} - \frac{4}{\sqrt{x}}$.

4.8.25 $\int(3x^{1/3} + 4x^{-1/3} + 6)\,dx = 3 \cdot \frac{3}{4}x^{4/3} + 4 \cdot \frac{3}{2}x^{2/3} + 6x + C = \frac{9}{4}x^{4/3} + 6x^{2/3} + 6x + C$. Check: $\frac{d}{dx}(\frac{9}{4}x^{4/3} + 6x^{2/3} + 6x + C) = 3x^{1/3} + 4x^{-1/3} + 6$.

4.8.27 Using Table 4.5 (formulas 1 and 2), $\int(\sin 2y + \cos 3y)\,dy = -\frac{1}{2}\cos 2y + \frac{1}{3}\sin 3y + C$. Check: $\frac{d}{dy}(\frac{-1}{2}\cos 2y + \frac{1}{3}\sin 3y + C) = \sin 2y + \cos 3y$.

4.8.29 Using Table 4.5 (formula 3), $\int(\sec^2 x - 1)\,dx = \tan x - x + C$. Check: $\frac{d}{dx}(\tan x - x + C) = \sec^2 x - 1$.

4.8.39 We have $F(x) = \int(x^5 - 2x^{-2} + 1)\,dx = \frac{x^6}{6} + 2x^{-1} + x + C$; substituting $F(1) = 0$ gives $\frac{1}{6} + 2 + 1 + C = 0$, so $C = -\frac{19}{6}$, and thus $F(x) = \frac{x^6}{6} + \frac{2}{x} + x - \frac{19}{6}$.

4.8.41 We have $F(v) = \int \sec v \tan v\,dtv = \sec v + C$; substituting $F(0) = 2$ gives $\sec 0 + C = 1 + C = 2$, so $C = 1$, and thus $F(v) = \sec v + 1$.