6.1.1

1. $\frac{dy}{dx} = (3x^2 + \cos x)dx$

$\int dy = \int (3x^2 + \cos x)dx$

$y = x^3 + \sin x + C$

2. $\frac{dy}{dx} = \frac{1}{x^3} + \frac{1}{x}$

$\int dy = \int \left(x^{-3} + \frac{1}{x}\right)dx$

$y = -\frac{1}{2}x^{-2} + \ln x + C$

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3. $\int \frac{dy}{dx} = \int \left(-\frac{1}{x^2+1} + e^{(-2x)}\right)dx$

$y = \cot^{-1}x - \frac{1}{2}e^{(-2x)} + C$

4. $\frac{dy}{dx} = e^{\sin x} \cdot \cos x$

$\int du = \int e^{(\sin x)} \cdot \cos x\, dx$

$u = e^{(\sin x)} + C$

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5. $\frac{dy}{dx} = 4\cos x$ $y=3$ when $x=\frac{\pi}{2}$

$(\frac{\pi}{2}, 3)$

$\int dy = \int 4\cos x \, dx$

$y = 4\sin x + C$

$3 = 4\sin\frac{\pi}{2} + C$

$3 = 4 + C$

$C = -1$

$y = 4\sin x - 1$

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6. $\frac{dy}{dx} = x^2 + \sqrt{x}$ $y=4$ $x=9$

$\int dy = \int (x^2 + \sqrt{x})\, dx$ $\sqrt{x} = x^{\frac{1}{2}}$

$y = \frac{1}{3}x^3 + \frac{2}{3}x^{\frac{3}{2}} + C$

$4 = \frac{1}{3}(9)^3 + \frac{2}{3}(9)^{\frac{3}{2}} + C$

$C = -257$

$y = \frac{1}{3}x^3 + \frac{2}{3}x^{\frac{3}{2}} - 257$

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7. $\frac{dy}{dx} = \sin x$ $f(0) = 4$ (x, y)

$\int dy = \int \sin x\,dx$

$y = -\cos x + C$

$4 = -\cos 0 + C$

$4 = -1 + C$

$C = 5$

$y = -\cos x + 5$

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8. $\frac{dy}{dx} = \frac{1}{x} + 8$ $y = 0$ $x = e$

$\int dy = \int \left(\frac{1}{x} + 8\right) dx$

$y = \ln x + 8x + C$

$0 = \ln e + 8e + C$

$0 = 1 + 8e + C$

$C = -1 - 8e$

$y = \ln x + 8x - 1 - 8e$

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9. $\frac{dy}{dx} = \tan^2 x \quad y=4 \quad x=3$

$\int dy = \int \tan^2 x \, dx$

$y = ?$

$y = \int_3^x \tan^2 t \, dt + C$

$4 = \int_3^3 \tan^2 t \, dt + C$

$\int_3^3 \tan^2 t \, dt = 0$

$4 = C$

$y = \int_3^x \tan^2 t \, dt + 4$

10. $\frac{dy}{dx} = \cos(e^x) \quad f(2) = 9$

$y = \int_2^x \cos e^t \, dt + 9$

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