$$\int \left(2x^2 + 1\right) dx = \frac{2}{3}x^3 + x + C$$

Scavenger Hunt

6.1/6.4

$$\int_1^2 \left(1-x^3\right)dx = x - \frac{1}{4}x^4\Big]_1^2$$

$$= \left(2-\frac{1}{4}(2)^4\right) - \left(1-\frac{1}{4}(1)^4\right)$$

$$= (2-4) - \left(1-\frac{1}{4}\right)$$

$$= -2 - \frac{3}{4}$$

$$= -2.75$$

$$= \frac{-11}{4}$$

Find the solution to the initial value problem

$$\cancel{(dx)}\frac{dy}{\cancel{dx}} = \frac{2x}{e^y}(dx) \qquad y(1) = 0$$

$$(e^y)\,dy = \frac{2x}{\cancel{e^y}}\,\cancel{dx\,(e^y)}$$

$$\int e^y dy = \int 2x\,dx$$

$$e^y = x^2 + C$$

$$e^0 = 1^2 + C$$

$$1 = 1 + C$$

$$0 = C$$

$$e^y = x^2$$

$$\ln e^y = \ln(x^2)$$

$$\boxed{y = \ln(x^2)}$$

$$\int \left(\sin x + \sec^2 x\right) dx = -\cos x + \tan x + C$$

Find the solution to the initial value problem

$$(\cancel{dx})\frac{dy}{\cancel{dx}} = y\left(1+e^x\right)dx \qquad y(2) = 1$$

$$\frac{dy}{y} = \frac{y(1+e^x)dx}{y}$$

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

$$\ln|y| = x + e^x + C$$

$$\ln|1| = 2 + e^2 + C$$

$$0 = 2 + e^2 + C$$

$$-2 - e^2 = C$$

$$\ln y = x + e^x - 2 - e^2$$

$$\boxed{y = e^{x + e^x - 2 - e^2}}$$

$\frac{2}{3} + \frac{3}{3} = \frac{5}{3}$

$\frac{5}{2} + \frac{2}{2} = \frac{7}{2}$

$$\int \left(x^{2/3} + x^{5/2}\right)dx = \frac{3}{5}x^{\frac{5}{3}} + \frac{2}{7}x^{7/2} + C$$

$$\int_1^4 \sqrt{x}\,dx = \int_1^4 x^{1/2}dx = \frac{2}{3}x^{3/2}\Big]_1^4$$

$$= \frac{2}{3}(4)^{3/2} - \frac{2}{3}(1)^{3/2}$$

$$= \frac{2}{3}\sqrt{4^3} - \frac{2}{3}$$

$$= \frac{2}{3}\sqrt{64} - \frac{2}{3}$$

$$= \frac{2}{3}\cdot 8 - \frac{2}{3}$$

$$= \frac{16}{3} - \frac{2}{3}$$

$$= \frac{14}{3}$$

Find the solution to the initial value problem

$$(dx)\ \frac{dy}{dx} = \frac{4\sqrt{y}}{x}\ dx \qquad y(e) = 1$$

$$\frac{dy}{\sqrt{y}} = \frac{\frac{4\sqrt{y}}{x}\ dx}{\sqrt{y}}$$

$$\frac{dy}{y^{1/2}} = \frac{4}{x}\ dx$$

$$\int y^{-1/2}\,dy = \int \frac{4}{x}\ dx$$

$$2y^{1/2} = 4\ln x + C$$

$$2(\sqrt{1}) = 4\ln e + C \qquad 2 = 4 + C$$

$$-2 = C$$

$$\frac{2y^{1/2}}{2} = \frac{4\ln x - 2}{2}$$

$$(\sqrt{y})^2 = (2\ln x - 1)^2$$

$$\boxed{y = (2\ln x - 1)^2}$$

$$\int \left(5\cos x + x^{-2}\right)dx = 5\sin x - x^{-1} + C$$

$$= 5\sin x - \frac{1}{x} + C$$

$$\int \frac{1}{\sqrt[3]{x}}\,dx = \int \frac{1}{x^{1/3}}$$

$$= \int x^{-1/3}$$

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

$$\int_0^{\pi/2} (2\cos t - \sin t)\,dx = 2\sin t + \cos t\Big]_0^{\pi/2}$$

$$= \left(2\sin\frac{\pi}{2} + \cos\frac{\pi}{2}\right) - \left(2\sin 0 + \cos 0\right)$$

$$= (2+0) - (0+1)$$

$$= 2-1$$

$$= 1$$

$$\int \left(3x^2 - \sin x + 2\sec^2 x\right)dx$$

$$\boxed{x^3 + \cos x + 2\tan x + C}$$

Find the solution to the initial value problem

$$dx\ \frac{dy}{dx} = y^2 \sin x\, dx \qquad y(0) = 2$$

$$\frac{dy}{y^2} = \frac{y^2 \sin x\, dx}{y^2}$$

$$\int y^{-2}\,dy = \int \sin x\, dx$$

$$-y^{-1} = -\cos x + C$$

$$-\frac{1}{y} = -\cos x + C$$

$$-\frac{1}{2} = -\cos(0) + C$$

$$-\frac{1}{2} = -1 + C \qquad C = \frac{1}{2}$$

$$(y)\ -\frac{1}{y} = \left(-\cos x + \frac{1}{2}\right)y$$

$$\frac{-1}{\left(-\cos x + \frac{1}{2}\right)} = \frac{y\left(-\cos x + \frac{1}{2}\right)}{\left(-\cos x + 1/2\right)}$$

$$\boxed{\frac{-1}{-\cos x + \frac{1}{2}} = y}$$

OR

$$\frac{-2}{-2\cos x + 1} = y$$