

1. Find f given the following. a)  $f'(x) = \sin x - \cos x - \csc^2 x$ ,  $f(\frac{\pi}{2}) = 1$

$$f(x) = -\cos x - \sin x + \cot x + C$$

$$1 = -\cos \frac{\pi}{2} - \sin \frac{\pi}{2} + \cot \frac{\pi}{2} + C$$

$$1 = 0 - 1 + 0 + C$$

$$2 = C$$

$$f(x) = -\cos x - \sin x + \cot x + 2$$

b)  $f''(x) = \frac{4x^4 - 3x}{x}$ ,  $f'(1) = 3$  and  $f(0) = 1$

$$f''(x) = 4x^3 - 3$$

$$f'(x) = x^4 - 3x + C$$

$$3 = 1 - 3 + C, C = 5$$

$$f'(x) = x^4 - 3x + 5$$

$$f(x) = \frac{1}{5}x^5 - \frac{3}{2}x^2 + 5x + C$$

$$, C = 1$$

$$f(x) = \frac{1}{5}x^5 - \frac{3}{2}x^2 + 5x + 1$$

c)  $f''(x) = 4\sqrt{x}(1 + \frac{1}{x^4})$ ,  $f(1) = 0$  and  $f(4) = 4$  General form

$$f''(x) = 4x^{1/2} + 4x^{-3/2}$$

$$f'(x) = \frac{4}{3/2}x^{3/2} + \frac{4}{-1/2}x^{1/2} + C$$

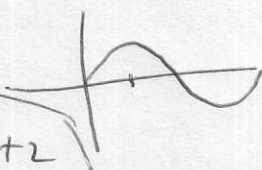
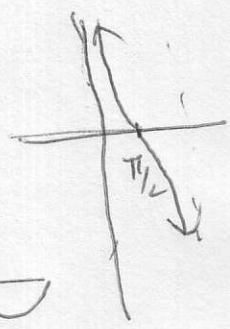
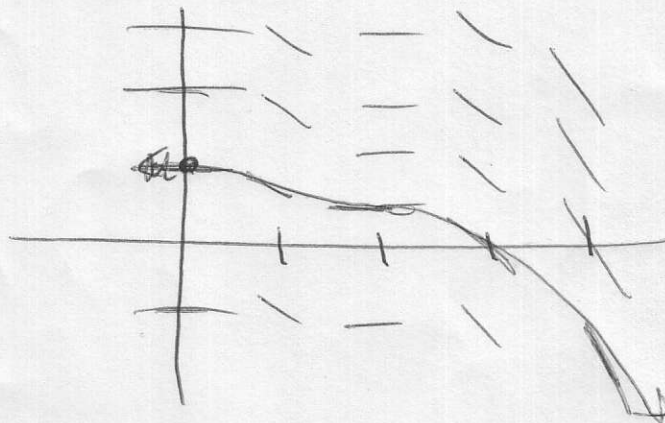
$$f'(x) = \frac{8}{3}x^{3/2} - \frac{8}{1}x^{1/2} + C; f(x) = \frac{8/3}{5/2}x^{5/2} - \frac{8}{3/2}x^{3/2} + Cx + D$$

$$f(x) = \frac{16}{15}x^{5/2} + \frac{16}{15}x^{3/2} + Cx + D$$

2. Use a direction field to graph the antiderivative F that satisfies F(0) = 1 given

$$f(x) = \sqrt{x} - x$$

x	f(x)
0	0
1	0
4	-2
3	$\sqrt{3} - 3$
2	$\sqrt{2} - 2$



3. A particle is moving with acceleration of  $a(t) = \sin t + \cos t$  Find the equation for the position function of the particle if  $v(0) = 1$  and  $s(0) = 2$ .

$$v(t) = -\cos t + \sin t + C \quad 1 = -1 + 0 + C \quad C = 2$$

$$v(t) = -\cos t + \sin t + 2$$

$$s(t) = -\sin t - \cos t + 2t + C \quad 2 = -0 - 1 + 0 + C, \quad C = 3$$

$$s(t) = -\sin t - \cos t + 2t + 3$$

4. A rock is dropped off the top of a tower and hits the ground at  $-128$  ft/sec. If acceleration due to gravity is  $-32$  ft/sec/sec, find how tall the tower is.



$$a(t) = -32$$

$$v(t) = -32t + v_0 = -32t$$

$$s(t) = -16t^2 + s_0 = -16t^2 + h$$

$$s(4) = -16(16) + h = h = 256 \text{ ft}$$

$$v = -128 \text{ at } t = 4 \text{ sec}$$

5. What constant acceleration is required to increase the speed of a car from 0 mi/h to 50 mi/h in 10 seconds?

$$5 \text{ m/hr/hr.}$$

$$v(t) = at$$

$$v(0) = a(0) = 0$$

$$v(10) = a(10) = 50$$

$$a = 5$$

$$\begin{array}{r} 16 \\ 16 \\ \hline 96 \\ 16 \\ \hline 256 \end{array}$$