Section 4.9, p. 279 **#14** $f(t) = 3\cos t - 4\sin t$

$$\int (3\cos t - 4\sin t)\,dt = +3\sin t + 4\cos t + C$$

Check: $\frac{d}{dt}(+3\sin t + 4\cos t + c) =$

$$3\cos t - 4\sin t + 0 = 3\cos t - 4\sin t \quad \checkmark$$

#20 $f(x) = x + 2\sin x$, $F(0) = -6$

$$\int f(x)\,dx = \int (x + 2\sin x)\,dx = \frac{1}{2}x^2 - 2\cos x + C = F(x)$$

$$F(0) = -6 = \frac{1}{2}\cdot 0^2 - 2\cos(0) + C$$

$$-6 = 0 - 2 + C$$

$$-4 = C$$

$$\boxed{F(x) = \frac{1}{2}x^2 - 2\cos x - 4}$$

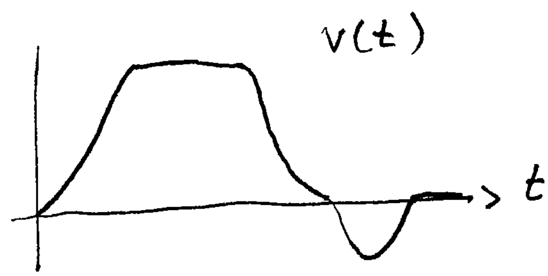
Section 4.9, p279 **#22** $f''(x) = 2 + x^3 + x^6$

$$f'(x) = \int f''(x)\,dx = \int (2 + x^3 + x^6)\,dx = 2x + \frac{x^4}{4} + \frac{x^7}{7} + C_1$$

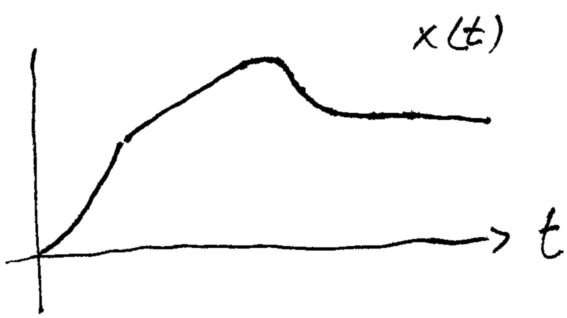
$$f(x) = \int f'(x) = \int \left(2x + \tfrac{1}{4}x^4 + \tfrac{1}{7}x^7 + C_1\right)dx$$

$$= \boxed{x^2 + \frac{1}{20}x^5 + \frac{1}{56}x^8 + C_1 x + C_2}$$

#46 $\frac{d}{dt}x(t) = v(t)$, so $\int v(t)\,dt = x(t) + C$



On any interval where v(t) is constant, x(t) will be linear, with slope equal to that constant value of v(t).



Wherever v(t) is positive, x(t) is increasing, and where v(t) is negative, x(t) is decreasing.

On intervals with v(t) = 0, x(t) is constant (this is a special case of the first note above.)

Section 4.9 p.280 #52 $v(t) = 1.5\sqrt{t}$, $s(4) = 10$

$\frac{d}{dt} s(t) = v(t)$, so $\int v(t)\,dt = s(t)$

$\int 1.5\sqrt{t}\,dt = \frac{3}{2}\int t^{1/2}\,dt = \frac{3}{2}\frac{2}{3}t^{3/2} + C = t^{3/2} + C = s(t)$

$s(4) = 10 = 4^{3/2} + C = (4^{\frac{1}{2}})^3 + C = (2)^3 + C = 8 + C$

$10 = 8 + C \Rightarrow C = 2$

$\therefore \boxed{s(t) = t^{3/2} + 2}$