

Anti-Derivatives

ex) If $f'(x) = 3x^2 + 12x + 7$, what is $f(x)$?

$$f(x) = x^3 + 6x^2 + 7x + C$$

If $f(-2) = 6$, what is $f(x)$? (What is C ?)

$$6 = (-2)^3 + 6(-2)^2 + 7(-2) + C$$

$$6 = -8 + 24 - 14 + C$$

$$4 = C$$

$$f(x) = x^3 + 6x^2 + 7x + 4$$

Check by
finding $f'(x)$: $f'(x) = 3x^2 + 12x + 7$

Find y for each given y' :

$$a) y' = 4x + 3$$

$$y = 2x^2 + 3x + C$$

$$b) y' = 2x^3 + x^2 + 10x - 6$$

$$y = \frac{1}{2}x^4 + \frac{1}{3}x^3 + 5x^2 - 6x + C$$

$$c) y' = 6e^{3x}$$

$$y = 2e^{3x} + C$$

$$d) y' = \frac{5}{x}$$

$$y = 5 \ln(x) + C$$

$$f) y' = 2 \sin 3x \cdot \cos 3x$$

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

$$e) y' = \sin 6x$$

$$y = -\frac{1}{6} \cos 6x + C$$

$$g) y' = \frac{3^{\sqrt{3x+4}}}{2\sqrt{3x+4}} \rightarrow \frac{3}{2} (3x+4)^{-1/2}$$

$$y = \sqrt{3x+4} + C \rightarrow (3x+4)^{1/2}$$

ex) If acceleration is $a = 6t + 4$, $v(1) = 2$,
and $d(2) = 14$, find v and d .

The anti-derivative of a is v .

$$v = 3t^2 + 4t + c$$

$$2 = 3(1)^2 + 4(1) + c$$

$$c = -5$$

$$v = 3t^2 + 4t - 5$$

$$d = t^3 + 2t^2 - 5t + c$$

$$14 = 2^3 + 2(2)^2 - 5(2) + c$$

$$c = 8$$

$$d = t^3 + 2t^2 - 5t + 8$$