

## Integrals – Day 1 Homework

## Antiderivatives

Find the general antiderivative of each function.

1.  $f(x) = 6x^2 - 8x + 3$

$$\underline{F(x) = 2x^3 - 4x^2 + 3x + C}$$

3.  $f(x) = \sqrt{x} + \sqrt[3]{x}$

$$\underline{F(x) = \frac{2}{3}x^{3/2} + \frac{3}{4}x^{4/3} + C}$$

5.  $f(x) = \frac{x^3 + 2x^2}{\sqrt{x}} = x^{5/2} + 2x^{3/2}$

$$\underline{F(x) = \frac{2}{7}x^{7/2} + \frac{4}{5}x^{5/2} + C}$$

7.  $f(x) = 3\cos x - 4\sin x$

$$\underline{F(x) = 3\sin x + 4\cos x + C}$$

9.  $f(x) = \frac{x^2 + x + 1}{x} = x + 1 + \frac{1}{x}$

$$\underline{F(x) = \frac{x^2}{2} + x + \ln|x| + C}$$

2.  $f(x) = 1 - x^3 + 5x^5 - 3x^7$

$$\underline{F(x) = x - \frac{x^4}{4} + \frac{5x^6}{6} - \frac{3x^8}{8} + C}$$

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

$$\underline{F(x) = -\frac{3}{x} + 5\ln|x| + C}$$

6.  $f(x) = \sqrt[3]{x^2} - \sqrt{x^3} = x^{2/3} - x^{3/2}$

$$\underline{F(x) = \frac{3}{5}x^{5/3} - \frac{2}{5}x^{5/2} + C}$$

8.  $f(x) = 4\sqrt{x} + e^x - \sec x \tan x$

$$\underline{F(x) = \frac{8}{3}x^{3/2} + e^x - \sec x + C}$$

10.  $f(x) = 6x^2 - 7\sec^2 x$

$$\underline{F(x) = 2x^3 - 7\tan x + C}$$

Find  $f(x)$ .

11.  $f'(x) = 1 - 6x$ ;  $f(0) = 8$

$$F(x) = x - 3x^2 + C$$

use  $(0, 8)$  to solve  
for  $c$

$$\underline{F(x) = x - 3x^2 + 8}$$

13.  $f'(x) = 3\cos x + 5\sin x$ ;  $f(0) = 4$

$$f(x) = 3\sin x - 5\cos x + C$$

use  $(0, 4)$

$$\underline{f(x) = 3\sin x - 5\cos x + 9}$$

15.  $f''(x) = x^2 + 3\cos x$ ;  $f(0) = 2, f'(0) = 3$

$$f'(x) = \frac{x^3}{3} + 3\sin x + C \quad (0, 3)$$

$$f'(x) = \frac{x^3}{3} + 3\sin x + 3$$

$$f(x) = \frac{x^4}{12} - 3\cos x + 3x + C \quad (0, 2)$$

$$\underline{f(x) = \frac{x^4}{12} - 3\cos x + 3x + 5}$$

$$3x^{1/2} - x^{-1/2}$$

12.  $f'(x) = 3\sqrt{x} - \frac{1}{\sqrt{x}}$ ;  $f(1) = 2$

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

Solve for  $c$

$$\underline{f(x) = 2x^{3/2} - 2x^{1/2} + 2}$$

14.  $f''(x) = x$ ;  $f(0) = -3, f'(0) = 2$

$$f'(x) = \frac{x^2}{2} + C \quad (0, 2)$$

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

$$f(x) = \frac{x^3}{6} + 2x + C \quad (0, -3)$$

$$f(x) = \frac{x^3}{6} - 2x - 3$$

16.  $f''(x) = 12x^2 - 6x + 2$ ;  $f(0) = 1, f'(2) = 11$

$$f'(x) = 4x^3 - 3x^2 + 2x + C \quad (2, 11)$$

$$f'(x) = 4x^3 - 3x^2 + 2x - 13$$

$$f(x) = x^4 - x^3 + x^2 - 13x + C \quad (0, 1)$$

$$\underline{f(x) = x^4 - x^3 + x^2 - 13x + 1}$$