

AP Calculus BC

WS 39 - Integration & Antiderivatives

1) $\int (2x^3 - 3x^{-4} + \sec^2 x)$

$$x^3 + x^{-3} + \tan x + C$$

2) $f(x) = \cos 8x$

$$F(x) = \frac{1}{8} \sin 8x$$

3) $\int (9x^{-1/2} + 9x^{1/2}) dx$

$$18x^{1/2} + 6x^{3/2} + C$$

4) $\int (4x^{1/3} + 2x^{-2/3} + 6) dx$

$$\frac{4x^{4/3}}{4/3} + \frac{2x^{1/3}}{1/3} + 6x + C$$

$$3x^{4/3} + 6x^{1/3} + 6x + C$$

5) $\int (\sec^2 x - 9) dx$

$$\tan x - 9x + C$$

6) $\int (e^{8x} + 5x^{1/2}) dx$

$$\frac{1}{8} e^{8x} + \frac{5x^{3/2}}{3/2} + C$$

7) $\int \frac{4x^4 - 15x^3}{x} dx$

$$\int (4x^3 - 15x^2) dx$$
$$x^4 - 5x^3 + C$$

8) $\int \frac{5+u}{u} du$

$$\int \left(\frac{5}{u} + 1\right) du$$

$$5 \ln|u| + u + C$$

9) $\int \frac{36t^8 - 7}{t} dt$

$$\int (36t^7 - 7t^{-1}) dt$$

$$4t^8 - 7 \ln|t| + C$$

10) $\frac{dy}{dx} = -2 \sin x - e^{-x} + 7x^6$

$$y = 2 \cos x + e^{-x} + x^7 + C$$

11) $\frac{ds}{dt} = -5 + 6 \cos t$ $s(0) = 2$

$$s = -5t + 6 \sin t + C$$

$$2 = 0 + 0 + C$$

$$s = -5t + 6 \sin t + 2$$

12) $\frac{dy}{dx} = -4e^x + \sin x$ $y = -10$ when $x = 0$

$$y = -4e^x - \cos x + C$$

$$-10 = -4 - 1 + C$$

$$-5 = C$$

$$y = -4e^x - \cos x - 5$$

$$13) \frac{du}{dx} = 6x^5 - 4x^3 + 4 \quad u = -2; x = 1$$

$$u = x^6 - x^4 + 4x + C$$

$$-2 = 1 - 1 + 4 + C$$

$$-6 = C$$

$$u = x^6 - x^4 + 4x - 6$$

$$14) \frac{dx}{dt} = \frac{7}{t} - \frac{3}{t^4} - 2$$

$$\frac{dx}{dt} = 7t^{-1} - 3t^{-4} - 2$$

$$x = 7\ln|t| + t^{-3} - 2t + C$$

$$-2 = 7\ln|1| + 1 - 2 + C$$

$$-1 = C$$

$$x = 7\ln|t| + t^{-3} - 2t - 1$$

$$15) F''(x) = \cos x$$

$$F'(x) = \sin x + C$$

$$5 = \sin \pi + C$$

$$5 = C$$

$$F'(x) = \sin x + 5$$

$$F(x) = -\cos x + 5x + C$$

$$6 = -\cos \pi + 5\pi + C$$

$$5 - 5\pi = C$$

$$F(x) = -\cos x + 5x + 5 - 5\pi$$