

AP Calculus BC
Unit 8 – Integration Techniques

Day 3 Notes: Inverse Trig Functions – Integration

Let u be a function of x and let a be a constant. Then

$$\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin \frac{u}{a} + C$$

$$\int \frac{du}{a^2 + u^2} = \frac{1}{a} \arctan \frac{u}{a} + C$$

$$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \operatorname{arcsec} \frac{|u|}{a} + C$$

<p>Example 1:</p> $\int \frac{dx}{4 + x^2}$	<p>Example 2:</p> $\int \frac{dx}{\sqrt{9 - 4x^2}}$
<p>Example 3:</p> $\int \frac{dx}{\sqrt{e^{2x} - 1}}$	<p>Example 4: (Complete the square..)</p> $\int \frac{dx}{x^2 + 6x + 13}$

Example 5:

(Complete the square & split the integral into 2...)

$$\int \frac{2x - 5}{x^2 + 2x + 2} dx$$

Example 6:

(Simplify the integrand first...)

$$\int \frac{x^4 - 1}{x^2 + 1} dx$$

Example 7:

Find the area of the region bounded by the graph of $f(x) = \frac{1}{\sqrt{3x - x^2}}$, the x-axis, and the lines $x = 3/2$ and $x = 9/4$.

AP Calculus BC
Unit 8 – Day 3 – Assignment

Name: _____

Find or evaluate the integral.

1) $\int \frac{3}{\sqrt{1-4x^2}} dx$	2) $\int_0^1 \frac{dx}{\sqrt{4-x^2}}$
3) $\int \frac{4}{1+9x^2} dx$	4) $\int \frac{1}{4+(x-1)^2} dx$
5) $\int \frac{x}{x^4+16} dx$	6) $\int \frac{1}{x\sqrt{x^4-4}} dx$

7)

$$\int_{-\sqrt{3}}^0 \frac{x}{1+x^2} dx$$

8)

$$\int_0^{\pi/2} \frac{\cos x}{1+\sin^2 x} dx$$

9)

$$\int_{-2}^2 \frac{dx}{x^2+4x+13}$$

10)

$$\int \frac{2x}{x^2+6x+13} dx$$

11)

$$\int \frac{1}{(x-1)\sqrt{x^2-2x}} dx$$

12)

$$\int \frac{x}{x^4+2x^2+2} dx$$