

**U-Substitution – More Examples**

$$\text{ex. } \int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$$

$$\text{ex. } \int \frac{\arctan x}{1+x^2} dx$$

$$\text{Do: } (\cot x)' =$$

$$\text{Do: } \int \sqrt{\cot x} \csc^2 x dx$$

**Definite Integrals with  $u$ -substitution**

**Recall FTC Part 2:**  $\int_a^b f(x) dx = F(b) - F(a)$

Do:  $\int_0^7 \sqrt{4+3x} dx$

ex.  $\int_0^{\pi/2} \cos x \cdot \sin(\sin x) dx$

**Symmetry Review****Even Functions****Odd Functions**

Do: Determine if the following functions are even or odd:

$$f(x) = x^4 + 1$$

$$f(x) = \frac{\tan x}{x^2}$$

**Integrating Symmetric Functions**

Rules:

if  $f$  is even:if  $f$  is odd:

ex.  $\int_{-1}^1 (x^4 + 1) dx$

ex.  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{\tan x}{x^2} dx$

**Building on Taking the Derivative of an Integral**

**Recall FTC Part 1:** If  $g(x) = \int_a^x f(t) dt$ , then  $g'(x) = f(x)$ .

Do:  $\frac{d}{dx} \int_1^x t^2 dt$

Why can we “ignore” the constant?