

§7.1 Method of u-substitution

Our goal today is to learn
how to find antiderivatives like

$$\textcircled{1} \int 3x^2 \cos(x^3) dx$$

$$\textcircled{2} \int x^3 \sqrt{x^4 + 5} dx$$

$$\textcircled{3} \int e^{\cos \theta} \sin \theta d\theta$$

What do you notice in the highlighted parts of
each of these?

Calc I review

How do we compute the derivative
of $f(g(x))$?

we use $\frac{d}{dx} (f(g(x))) = f'(g(x)) g'(x)$

(the chain rule)

Example Find the following derivatives:

(1) $\frac{d}{dx} (\cos(x^3))$

(2) $\frac{d}{dx} (\sqrt{4x^5+5})$

(3) $\frac{d}{d\theta} (e^{\cos\theta})$

Example Find the following antiderivatives

$$\textcircled{1} \int x e^{x^2} dx$$

$$\textcircled{2} \int e^{5x} dx$$

$$\textcircled{3} \int \frac{3x}{\sqrt{x^2+1}}$$

$$\textcircled{4} \int \frac{3x}{4x^2+2} dx$$