Practice *u*-substitution foundation skill:

Do: $\int \cos \alpha x \, dx$ where α is a constant   Do: $\int e^{\beta x} dx$ where β is a constant

Integration by Parts (IBP)

one function will becomes *u* and the other function becomes *dv*.

$$\int u \, dv = uv - \int v \, du$$

ex. $\int x e^{3x} dx$

Do the following *two* problems, which may or may not require IBP.

Do: $\int 3x \cos x \, dx$

Do: $\int \sec^2 \left(\dfrac{x}{\pi} \right) dx$

Recall: Sometimes it's necessary to use IBP multiple times:

ex. $\int 4t^2 e^{6t} \, dt$

Do: $\int 7x^2 \cdot e^{5x} \, dx$

Last Time, it was more advantageous to let *u* = ln *x*: $\int x^5 \ln x \, dx$

The next one is similar but notice it's a **definite** integral:

ex. $\int_1^2 \dfrac{\ln x}{x^2} \, dx$

Like *u*-sub, sometimes the "second" function isn't obvious:

ex. $\int_0^1 \arctan x \, dx$

How to decide which is *u* and which is *dv*?

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Then … there's this …

$\int e^x \sin x \, dx$

Try on your own: work through problem above with $u = \sin x$