

DATE: _____

Substitution or NOT? If not, why? If yes, what is u? (or—what are you?)
DO NOT INTEGRATE!

1. $\int (2x^2 - 3x^4) dx$ NO, just substitution so separate $\int 2x^2 dx - \int 3x^4 dx$

2. $\int (2x-3)^3 dx$ YES! $u = 2x-3$

3. $\int (x+1)(3x-2) dx$ NO, just multiply + separate $\int (3x^2 + x - 2) dx$

4. $\int (x^2 \sqrt{x}) dx$ NO just simplify $\int x^2 x^{1/2} dx = \int x^{5/2} dx$

5. $\int (\sin x \cos x) dx$ yes $u = \sin x$ or $u = \cos x$

6. $\int (\sin 2x) dx$ yes $u = 2x$

7. $\int (\sin x - \cos x) dx$ NO just subtraction so separate $\int \sin x dx - \int \cos x dx$

8. $\int (x \sin x^2) dx$ yes $u = x^2$

What's the difference between $\int (\sin x^2) dx$, $\int (\sin x)^2 dx$, and $\int (\sin^2 x) dx$?

$$\begin{array}{ccc}
 \int (\sin x^2) dx & \int (\sin x)^2 dx & \int (\sin^2 x) dx \\
 \downarrow & \uparrow \text{the sine is squared} & \leftarrow = \int (\sin x)^2 dx \\
 = \int \sin(x^2) dx & & \uparrow \\
 \uparrow & & \text{again, sine is squared} \\
 \text{the } x \text{ is squared} & &
 \end{array}$$