Math 2167: Homework 9
Due: Monday, December 2nd

1) If the indefinite integral looks *something* like
\[ \int \text{stuff}' \cdot (\text{stuff})^n \, dx \]
then guess \( \text{stuff}^{n+1} \)
where \( n \neq -1 \). Try your hand at these integrals:

(a) \( \int 2x(x^2 + 4)^5 \, dx \)  
(b) \( \int \frac{\sqrt{\ln(x)}}{x} \, dx \)

In each case, explain your reasoning, identifying your guesses.

2) If the indefinite integral looks *something* like
\[ \int \text{junk} \cdot e^{\text{stuff}} \, dx \]
then guess \( e^{\text{stuff}} \) or \( \text{junk} \cdot e^{\text{stuff}} \).

Try your hand at these integrals:

(a) \( \int 3x^2 e^{x^{-1}} \, dx \)  
(b) \( \int xe^{-x/2} \, dx \)

In each case, explain your reasoning, identifying your guesses.

3) If the indefinite integral looks *something* like
\[ \int \frac{\text{stuff}'}{\text{stuff}} \, dx \]
then guess \( \ln(\text{stuff}) \).

Try your hand at these integrals:

(a) \( \int \frac{1}{2x} \, dx \)  
(b) \( \int \frac{1}{x \ln(x^2)} \, dx \)

In each case, explain your reasoning, identifying your guesses.
4) If the indefinite integral looks something like
\[ \int \text{junk} \cdot \sin(\text{stuff}) \, dx \]
then guess \( \cos(\text{stuff}) \) or \( \text{junk} \cdot \cos(\text{stuff}) \).
likewise if you have
\[ \int \text{junk} \cdot \cos(\text{stuff}) \, dx \]
then guess \( \sin(\text{stuff}) \) or \( \text{junk} \cdot \sin(\text{stuff}) \).

Try your hand at these integrals:

(a) \( \int 5x^4 \sin(x^5 + 3) \, dx \)  
(b) \( \int \frac{\cos(\ln(x))}{x} \, dx \)

In each case, explain your reasoning, identifying your guesses.