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

1) If the indefinite integral looks *something* like

$$\int \text{stuff}' \cdot (\text{stuff})^n \, dx \qquad \text{then guess} \qquad \text{stuff}^{n+1}$$

where $n \neq -1$. Try your hand at these integrals:

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

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

2) If the indefinite integral looks *something* like

$$\int \text{junk} \cdot e^{\text{stuff}} \, dx \qquad \text{then guess} \qquad e^{\text{stuff}} \textbf{ or } \text{junk} \cdot e^{\text{stuff}}.$$

Try your hand at these integrals:

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

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

3) If the indefinite integral looks *something* like

$$\int \frac{\text{stuff}'}{\text{stuff}} \, dx \qquad \text{then guess} \qquad \ln(\text{stuff}).$$

Try your hand at these integrals:

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

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

4) If the indefinite integral looks *something* like

$$\int \text{junk} \cdot \sin(\text{stuff})\, dx \qquad \text{then guess} \qquad \cos(\text{stuff}) \textbf{ or } \text{junk} \cdot \cos(\text{stuff}),$$

likewise if you have

$$\int \text{junk} \cdot \cos(\text{stuff})\, dx \qquad \text{then guess} \qquad \sin(\text{stuff}) \textbf{ or } \text{junk} \cdot \sin(\text{stuff}),$$

Try your hand at these integrals:

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

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