MATH 1B Fall 2015
Section 2 Name: ______________________________

Before doing problems, let's do a little recap on **Integration by Parts**.
Recall the product rule : $(uv)' = u'v + v'u \Rightarrow \int v'u = uv - \int u'v$.

My secret way of memorizing the formula:
Integrate the first one while keeping the second one, then subtract the integral of the derivative of the first one and the antiderivative of the second one.

Warm Up Questions:

1. $\displaystyle\int x \ln x = \frac{1}{2}x^2 \ln x - \frac{1}{4}x^2 + C$

2. $\displaystyle\int e^x \cos x = \frac{e^2(\cos x + \sin x)}{2} + C$

Slightly more complicated :)

3. $\displaystyle\int 2x \arctan x = x^2 \arctan x - x + \arctan x + C$

4. $\displaystyle\int x \sin x \cos x = \frac{1}{2}x \sin^2 x - \frac{1}{4}x + \frac{1}{8}\sin 2x + C$

5. $\displaystyle\int (\frac{\ln x}{x})^2 = -\frac{(\ln x)^2}{x} - \frac{2\ln x}{x} - \frac{2}{x} + C$

Ultimate challenges :D

6. $\displaystyle\int \sin 3x \cos 5x = -\frac{1}{16}\cos 8x + \frac{1}{4}\cos 2x + C$
Comment: use integration by part twice, or use trig identity:
$\sin a + b = \sin a \cos b + \sin b \cos a$.

7. $\displaystyle\int \frac{x^2}{\sqrt{1-x^2}} = \frac{1}{2}(\arcsin x - x\sqrt{1-x^2}) + C$
Comment: use integration by part knowing $((\arcsin x)' = \frac{1}{\sqrt{1-x^2}})$ **or use trig substitution. Either way you will end up integrating** $\sin^2 x$