U can Integrate (Lecture Assignment)

Complete this assignment and submit it to Gradescope by 4:00pm on your class day. You can print this sheet, or write on your own paper. Contact us if internet connections or other issues require alternate arrangements.

Use the Substitution Rule to evaluate each of the following integrals.

1. $\int e^x \cos(3e^x + 5)\, dx$

$u = 3e^x + 5$

$\frac{du}{dx} = 3e^x$

$du = 3e^x dx$

$\int e^x \cos(3e^x+5)\, dx = \int \frac{1}{3} \cdot 3e^x \cos(u)\, dx = \int \frac{1}{3}\cos(u)\, du = \frac{1}{3}\int \cos(u)\, du = \frac{1}{3}\cdot \sin(u) + C$

$= \frac{\sin(3e^x+5)}{3} + C$

2. $\int 200x\left(x^2-1\right)^{99}\, dx$

$u = x^2 - 1$

$\frac{du}{dx} = 2x$

$du = 2x\, dx$

$\int 100(u)^{99}\, du = 100 \cdot \frac{u^{100}}{100} + C = u^{100} + C = (x^2-1)^{100} + C$

3. $\int_0^1 x^2(1+x^3)^5\, dx$

$u = 1 + x^3$

$\frac{du}{dx} = 3x^2$

$\int_1^2 \frac{1}{3} \cdot 3x^2 (u)^5\, dx = \frac{1}{3}\int_1^2 u^5\, du = \frac{1}{3}\left[\frac{u^6}{6}\right]_1^2 = \frac{7}{2}$

One-Minute Questions: Write a sentence for each.

A. What's one mathematical question you have after watching the videos?

Can there be a non-infinity value for an interval from a to infinity.

B. What's one interesting thing you learned from the book or videos?

$6 \cdot \frac{1}{6} = 1$. Nice trick I'll do that more.