

Math 1B: Discussion 1/29/19

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The quiz this Thursday will be about integration by parts. There will be four integrals, and your top three scores out of four will be taken. The integrals will be based on the examples below and the examples that we did in class. In addition, you will be expected to know the derivatives of the following functions.

- Polynomials, powers (power rule), exponential functions, natural log
- Trigonometric functions (sine, cosine, tangent, secant, cosecant, cotangent)
- Inverse trigonometric functions, excluding arcsec and arccsc. (So arcsin, arccos, arctan, arccot)

Question 1

Compute the following integrals. You may need to use either u-substitution, integration by parts, or both.

$$\int \tan(x) dx$$

(Hint: Trigonometry)

$$\int x^3 \sin(x^2) dx$$

(Hint: u -substitution, then integration by parts)

$$\int_0^1 \arcsin(x) dx$$

$$\int e^x \sin(2x) dx$$

$$\int_1^e x \ln(x) dx$$

$$\int \frac{\ln x}{x} dx$$

$$\int \frac{\ln x}{x^2} dx$$

$$\int (\ln x)^3 dx$$

(Hint: Integrate by parts... three times)

$$\int e^{(e^x+x)} dx$$

(Hint: Rewrite using laws of exponents)

$$\int \sqrt{x} e^{\sqrt{x}} dx$$

$$\int_1^e \frac{1}{x + x(\ln(x))^2} dx$$

$$\int \frac{1}{x^{1/2} + x^{3/2}} dx$$

(Hint: u -substitution)

Question 2 (*)

Find a formula for positive integers n for the following integrals.

$$\int x^n \ln(x) dx$$

$$\int x^n e^x dx$$

$$\int x^n e^{3x} dx$$

(Hint: How can you use your answer for the second integral to get an answer for the third integral?)