MAT 126.01, Prof. Bishop, Tuesday, Oct 20, 2020
Last minute review for midterm
Section 2.7: Integrals, Exponentials and Logarithms

Any last minute questions about Midterm 2?

The power law for integrals:

$$\int x^n dx = \frac{1}{n+1} x^{n+1}, n \neq -1.$$

Definition of natural logarithm:

$$\ln x = \int_1^x \frac{1}{t} dt.$$

Differentiation law:

$$(\ln x)' = \frac{1}{x}.$$

Properties:

$\ln 1 = 0$

$\ln(ab) = \ln a + \ln b$

$\ln(a/b) = \ln a - \ln b$

$\ln a^p = p \ln a.$

Definition of e: e is the unique number so $\ln e = 1$.

e^x is defined as the unique number y so $\ln y = x$.

Properties of exponential function:

$e^{x+y} = e^x \cdot e^y$

$e^{x-y} = e^x / e^y$

$(e^x)^p = e^{xp}.$

General exponential functions:

If $a > 0$ define $a^x = e^{x \ln a}$

Deduce $(a^x)' = a^x \ln a$

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Deduce $\int a^x = (a^x / \ln a) + Ci$

General logarithmic functions:

Define $\log_a x = \ln x / \ln a$.

Deduce $(\log_a x) = 1/(x \ln a)$.

Differentiate $\ln \ln \ln x$.

Differentate $\ln(x + \sqrt{1 + x^2})$

Differentiate $x^{\sin x}$.

Differentiate $(\sin x)^x$ for $0 < x < \pi$.