

THINGS TO KNOW FOR THE MATH-125 FINAL EXAM
on Monday, December 13, 1999 at 5:00pm

1. DERIVATIVES OF ELEMENTARY FUNCTIONS

The following are the formulas for derivatives of elementary functions that you should know for the Final Exam.

1.1: Power Functions.

$$\frac{d}{dx} u^p = p u^{p-1} \frac{du}{dx}$$

1.2: Exponential Functions.

$$\frac{d}{dx} e^u = e^u \frac{du}{dx}$$

$$\frac{d}{dx} a^u = \ln(a) a^u \frac{du}{dx}$$

1.3: Logarithmic Functions.

$$\frac{d}{dx} \ln(u) = \frac{1}{u} \frac{du}{dx}$$

$$\frac{d}{dx} \log_a(u) = \frac{1}{\ln(a)} \frac{1}{u} \frac{du}{dx}$$

1.4: Trigonometric Functions.

$$\frac{d}{dx} \sin(u) = \cos(u) \frac{du}{dx}$$

$$\frac{d}{dx} \cos(u) = -\sin(u) \frac{du}{dx}$$

$$\frac{d}{dx} \tan(u) = \sec^2(u) \frac{du}{dx}$$

or

$$\frac{d}{dx} \tan(u) = \frac{1}{\cos^2(u)} \frac{du}{dx}$$

1.5: Hyperbolic Functions.

$$\frac{d}{dx} \sinh(u) = \cosh(u) \frac{du}{dx}$$

$$\frac{d}{dx} \cosh(u) = \sinh(u) \frac{du}{dx}$$

$$\frac{d}{dx} \tanh(u) = \operatorname{sech}^2(u) \frac{du}{dx}$$

or

$$\frac{d}{dx} \tanh(u) = \frac{1}{\cosh^2(u)} \frac{du}{dx}$$

1.6: Inverse Trigonometric Functions.

$$\frac{d}{dx} \sin^{-1}(u) = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$$

$$\frac{d}{dx} \tan^{-1}(u) = \frac{1}{1+u^2} \frac{du}{dx}$$

2. INDEFINITE INTEGRALS WITH ELEMENTARY FORMS

The following are the formulas for indefinite integrals with elementary forms that you should know for the Final Exam.

2.1: Power Functions.

$$\int u^p du = \begin{cases} \frac{1}{p+1}u^{p+1} + C & \text{for } p \neq -1 \\ \ln(|u|) + C & \text{for } p = -1 \end{cases}$$

2.2: Exponential Functions.

$$\int e^u du = e^u + C \qquad \int a^u du = \frac{1}{\ln(a)} a^u + C$$

2.3: Trigonometric Functions.

$$\begin{aligned} \int \cos(u) du &= \sin(u) + C & \int \sin(u) du &= -\cos(u) + C \\ \int \sec^2(u) du &= \tan(u) + C & \int \frac{1}{\cos^2(u)} du &= \tan(u) + C \end{aligned}$$

2.4: Hyperbolic Functions.

$$\begin{aligned} \int \cosh(u) du &= \sinh(u) + C & \int \sinh(u) du &= \cosh(u) + C \\ \int \operatorname{sech}^2(u) du &= \tanh(u) + C & \int \frac{1}{\cosh^2(u)} du &= \tanh(u) + C \end{aligned}$$

2.5: Algebraic Functions.

$$\int \frac{1}{\sqrt{1-u^2}} du = \sin^{-1}(u) + C \qquad \int \frac{1}{1+u^2} du = \tan^{-1}(u) + C$$

3. CALCULATORS

Be sure the program 'ALLSUMS' is working on your calculator, and that you know how to use it. Also be sure your calculator is functional for the Final Exam. **CHECK THAT THE BATTERIES ARE NOT LOW!**