MATH 112, DERIVATIVES AND INTEGRALS

How to take Derivatives in Math 112

Step 0: Expand, simplify, rewrite powers.

Step 1: Identify PRODUCT, QUOTIENT or CHAIN

$$(F(x)S(x))' = F(x)S'(x) + F'(x)S(x)$$

$$\left(\frac{N(x)}{D(x)}\right)' = \frac{D(x)N'(x) - N(x)D'(x)}{\big(D(x)\big)^2}$$

$$\big(f\big(g(x)\big) \big)' = f'\big(g(x)\big)g'(x)$$

we have three versions of the chain rule

$$\left(\big(g(x)\big)^n \right)' = n\big(g(x)\big)^{n-1} \cdot g'(x)$$

$$\left(e^{g(x)} \right)' = e^{g(x)} \cdot g'(x)$$

$$\Big(\ln\big(g(x)\big)\Big)' = \frac{1}{g(x)} \cdot g'(x)$$

Step 2: Go back to step 1 to get any subsequent derivatives you need until you are done.

How to Integrate in Math 112

Step 0: Expand, simplify, rewrite powers.

Step 1: Identify the following:

$$\int x^n \, dx = \frac{1}{n+1} x^{n+1} + C \quad (n \neq -1)$$

$$\int (x+a)^n \, dx = \frac{1}{n+1} (x+a)^{n+1} + C \ (n \neq -1)$$

$$\int \frac{1}{x} \, dx = \ln(x) + C$$

$$\int e^{ax} \, dx = \frac{1}{a} \mathrm{e}^{ax} + C$$

$$\int k \, dx = kx + C$$

Step 2: Check by differentiating. Done!!