October 10

SWBAT:

Derive the second part of Fundamental Theorem of Calculus

$(x^3)^2$

$\frac{d}{dx}\left(\int_5^{x^3} \sin\left(t^2+3\right) dt\right)$ $\qquad$ $\sin\left(x^6+3\right)\left(3x^2\right)$

$\frac{d}{dx}\left(\int_{-3}^{4x+7} \sqrt{\ln(t)}\, dt\right)$ $\qquad$ $\sqrt{\ln(4x+7)}(4)$

$\frac{d}{dx}\left(\int_{2x}^{10} \ln(\cos t)\, dt\right)$ $\qquad$ $-\ln(\cos(2x))(2)$

$\frac{d}{dx}\left(\int_{5x}^{2x^2} e^{t^3-7}\, dt\right)$ $\qquad$ $e^{\left(2x^2\right)^3-7}(4x)-e^{(5x)^3-7}(5)$

$e^{2^3x^6-7}(4x)-e^{125x^3-7}(5)$

$\frac{d}{dx}\left(\int_{\cos x}^{\ln x} \sqrt{\sin\left(x^2+3\right)}\, dt\right)$ $\qquad$ $\sqrt{\sin\left((\ln x)^2+3\right)}\left(\frac{1}{x}\right)-\sqrt{\sin\left((\cos x)^2+3\right)}(-\sin x)$

Fundamental Theorem of Calculus (part 2)

$$\frac{d}{dx}\left(\int_{u(x)}^{v(x)} f(t)\,dt\right)$$

$$= f(v(x))(v'(x)) - f(u(x))(u'(x))$$

The function evaluated at the upper bound times the derivative of the upper bound minus the function evaluated at the lower bound times the derivative of the lower bound

$$\frac{d}{dx}\left(\int_{x^2}^{5x} e^{\cos t}\,dt\right)$$

$$e^{\cos 5x}(5) - e^{\cos x^2}(2x)$$

$$\frac{d}{dx}\left(\int_{\sin x}^{7x^3} \ln(\sec t)\,dt\right)$$

$$\ln(\sec 7x^3\ )(21x^2) - \ln(\sec\sin(x))(\cos(x))$$

#7

$$\int_2^x u^4\,du$$

$$= \frac{u^5}{5}\Big|_2^x = \frac{x^5}{5} - \frac{2^5}{5}$$

$$\frac{x^5}{5} - \frac{32}{5}$$

#7-16,
21-26,
28-34,
39, 45
Pg 320

$$\int_b^a e^{3u}\,du = \frac{1}{3}e^{3u}\Big|_b^a$$

$$\int_a^b e^{-u}\,du = -e^{-u}\Big|_b^a$$