September 14

SWBAT:

Evaluate definite integrals using the Fundamental Theorem of Calculus

Fundamental Theorem of Calculus

(one part)

$$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$$

$$F'(x) = f(x)$$

$$\int_1^4 \left(\frac{2}{x} - e^x + \sin x\right) dx$$

$$\int_1^4 \frac{2}{x}\,dx - \int_1^4 e^x\,dx + \int_1^4 \sin x\,dx$$

$$2\int_1^4 \frac{1}{x}\,dx - \int_1^4 e^x\,dx + \int_1^4 \sin x\,dx$$

$\frac{d}{dx}(?) = \frac{1}{x}$ $\quad ? = \ln(x)$

$\frac{d}{dx}(?) = e^x$ $\quad ? = e^x$

$\frac{d}{dx}(?) = \sin x$ $\quad ? = -\cos x$

$$= 2\ln(x)\Big|_1^4 - e^x\Big|_1^4 - \cos x\Big|_1^4$$

$$2(\ln 4 - \ln(1)) - (e^4 - e^1) - (\cos(4) - \cos(1))$$

$$2\ln(x) - e^x - \cos x\,\Big|_1^4$$

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if $f(3) = 7$
and $f(10) = -2$
find
$\int_3^{10} 4f'(x) + 1\,dx$

$$= \int_3^{10} 4f'(x)\,dx + \int_3^{10} 1\,dx$$

$$= 4\int_3^{10} f'(x)\,dx + \int_3^{10} 1\,dx$$

$\frac{d}{dx}(?) = f'(x)$ $\quad ? = f(x)$

$\frac{d}{dx}(?) = 1$ $\quad ? = x$

$$= 4f(x)\Big|_3^{10} + x\Big|_3^{10}$$

$$= 4(f(10) - f(3)) + (10 - 3) = 4(-2 - 7) + 7$$

$$= -29$$