March 18

Mock Exam:
March 27th - 7:30 am
Room 5
Have you paid for your AP test?

How is taking the derivative of an integral different from evaluating a definite integral?

March 18

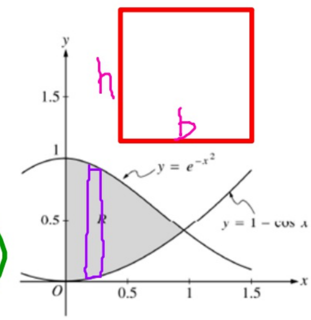
Students will verbally explain how to apply the second part of the Fundamental Theorem of Calculus (using the words: chain rule, derivative, function, bound...)

1. Below are six volume problems – which problems will have π in the answer?

2. Write, but do not solve, an integral expression that can be used to find the volume for each problem.

Problem B

Let R be the shaded region in the first quadrant enclosed by the graphs of e^{-x^2}, $y = 1 - \cos x$, and the y-axis, as shown in the figure. The region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is a square. Find the volume of the solid.



$A = b^2 \quad b = e^{-x^2} - (1 - \cos x)$

$A = \left(e^{-x^2} - (1 - \cos x)\right)^2$

$$V = \int_0^{.941} \left(e^{-x^2} - (1 - \cos x)\right)^2 dx$$

Fundamental Theorem of Calculus (the second part)

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

$$= f(h(x))h'(x) - f(g(x))g'(x)$$

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

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

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

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

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

$$\ln(\sec\sin(x))(\cos(x))$$

$$\frac{d}{dx}\left(\int_{5}^{x^3} \sin\left(t^2+3\right) dt\right)$$

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

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

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

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