

5.4 Opener Day 2

Wednesday, February 4, 2015
6:44 AM

AP Calculus AB
5.4 Day 2 opener

Name _____

Evaluate the integral: (Part 2 - Fund Thm)

a. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} (-\csc^2 x) dx$

$$= \cot x \Big|_{\frac{\pi}{6}}^{\frac{\pi}{3}} = \cot \frac{\pi}{3} - \cot \frac{\pi}{6}$$

$$= \frac{\sqrt{3}}{3} - \sqrt{3}$$

$$= \boxed{\frac{-2\sqrt{3}}{3}}$$

b. $\int_4^1 \frac{x^2 - x^4}{2x^4} dx = -\int_1^4 \left(\frac{1}{2x^2} - \frac{1}{2} \right) dx$

$$= -\left[\frac{1}{2}(-1)x^{-1} - \frac{1}{2}x \right]_1^4$$

$$= -\left[-\frac{1}{2x} - \frac{1}{2}x \right]_1^4 = \left[\frac{1}{2x} + \frac{1}{2}x \right]_1^4$$

$$= \left(\frac{1}{2(4)} + \frac{1}{2}(4) \right) - \left(\frac{1}{2(1)} + \frac{1}{2}(1) \right)$$

$$= \frac{1}{8} + 2 - \frac{1}{2} - \frac{1}{2} = \frac{1}{8} = \boxed{\frac{9}{8}}$$

(no calculator) Find the area between the curve $g(x) = x^2 - x$ and the x-axis on the interval $[-1, 1]$.

$$A = \int_{-1}^1 (x^2 - x) dx = \left[\frac{1}{3}x^3 - \frac{1}{2}x^2 \right]_{-1}^1 = \left(\frac{1}{3}(1)^3 - \frac{1}{2}(1)^2 \right) - \left(\frac{1}{3}(-1)^3 - \frac{1}{2}(-1)^2 \right)$$

$$= \left(\frac{1}{3} - \frac{1}{2} \right) - \left(-\frac{1}{3} - \frac{1}{2} \right)$$

$$= \boxed{\frac{2}{3}}$$

If $f(x) = \sqrt{9-x^2}$ and $F(0) = 4$, find $F(3)$. (Fund Thm Part 2)

$$F(3) = F(0) + \int_0^3 \sqrt{9-x^2} dx$$

$$= \boxed{4 + \frac{9}{4}\pi}$$



