Name: due September 4 by 3:00 pm Pacific

Math 126 **Homework Assignment 5** **Fall 2020**

1. Evaluate $\displaystyle\int_2^4 \frac{8}{x^3}\,dx$. By the FTC, we have

$$\int_2^4 \frac{8}{x^3}\,dx = -\frac{4}{x^2}\Big|_2^4 = -\frac{1}{4}-(-1) = \frac{3}{4}.$$

$$\left[\; 8x^{-3} \rightarrow \frac{8}{-2}x^{-2} = -4x^{-2} \;\right]$$

2. Evaluate $\displaystyle\int_0^1 \left(2x^2 + \sqrt[3]{x}\right) dx$.

$$\int_0^1 \left(2x^2 + x^{1/3}\right) dx = \left(\frac{2}{3}x^3 + \frac{3}{4}x^{4/3}\right)\Big|_0^1$$

$$= \frac{2}{3} + \frac{3}{4}$$

$$= \frac{17}{12}.$$

FTC

evaluate

3. Evaluate $\displaystyle\int_0^4 \frac{3}{x+4}\,dx$. Using the FTC,

$$\int_0^4 \frac{3}{x+4}\,dx = 3\ln|x+4|\,\Big|_0^4$$

$$= 3(\ln 8 - \ln 4)$$

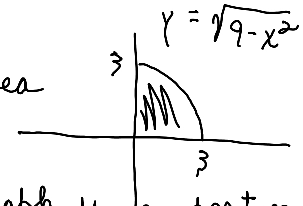
$$= 3\ln 2.$$

$$\left[\ln\frac{8}{4} = \ln 8 - \ln 4\right]$$

4. Evaluate $\int_0^3 8\sqrt{9-x^2}\,dx$. (Please think first.)

$$\int_0^3 8\sqrt{9-x^2}\,dx = 8\int_0^3 \sqrt{9-x^2}\,dx$$
$$= 8 \cdot \frac{1}{4}\pi \cdot 3^2$$
$$= 18\pi .$$

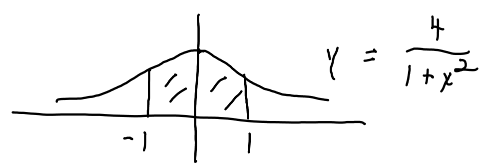
use area



graph is a portion of the circle $x^2+y^2=9$

5. Find the area of the region under the curve $y = 4/(1+x^2)$ and above the x-axis on the interval $[-1, 1]$.

$$A = \int_{-1}^{1} \frac{4}{1+x^2}\,dx$$
$$= 2\int_0^1 \frac{4}{1+x^2}\,dx$$
$$= 8\arctan x \Big|_0^1 \qquad \text{FTC}$$
$$= 8\left(\frac{\pi}{4} - 0\right)$$
$$= 2\pi.$$



note symmetry

The area under the curve is 2π square units.

6. Create and solve your own simple "evaluate an integral" problem.

many options here

for variety, maybe one using e^x or $\sin(2x)$, etc