Math 233 - Quiz 11

April 27, 2023

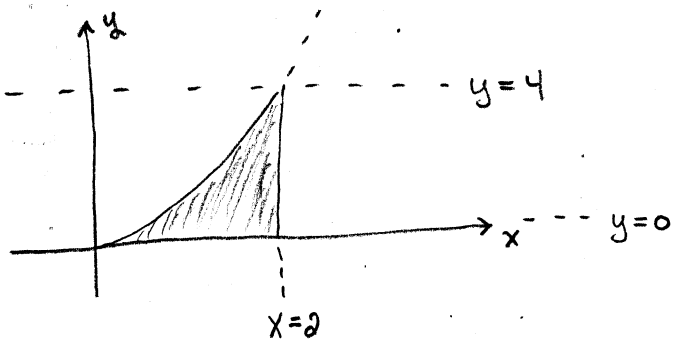
Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (8 points) Sketch the region of integration, reverse the order of integration, and evaluate.

$$\int_0^4 \int_{\sqrt{y}}^2 \frac{\sin(x^2)}{x}\,dx\,dy$$



$$\int_{x=0}^{x=2} \int_{y=0}^{y=x^2} \frac{\sin(x^2)}{x}\,dy\,dx$$

$$= \int_0^2 \frac{y \sin x^2}{x}\Bigg|_{y=0}^{y=x^2} dx = \int_0^2 x \sin x^2\,dx$$

$u = x^2$

$du = 2x\,dx$

$\frac{1}{2}du = x\,dx$

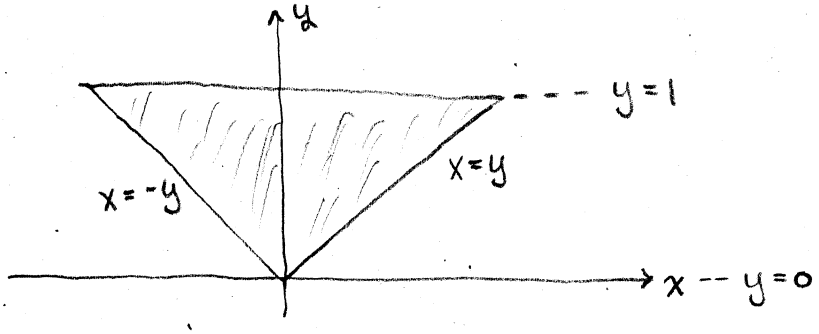
$$= \frac{1}{2}\int_0^4 \sin u\,du$$

$$= \frac{1}{2} - \frac{1}{2}\cos(4)$$

2. (2 points) Briefly explain why the reversed order of integration would require a sum of two separate iterated integrals. Write those integrals, but do not evaluate.

IT'S TYPE II AS IT IS.

$$\int_0^1 \int_{-y}^{y} (x^2 + y^2)\,dx\,dy$$



WHEN RETHINKING AS A TYPE I REGION, THE BOTTOM CURVE IS ACTUALLY TWO CURVES DEPENDING ON THE X-VALUES.

$$\int_{-1}^{0} \int_{-x}^{1} (x^2+y^2)\,dy\,dx + \int_{0}^{1} \int_{x}^{1} (x^2+y^2)\,dy\,dx$$