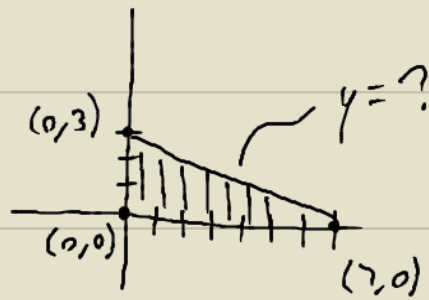


$$1. f(x,y) = 3x + 3y$$

$$f_x = 3$$

$$f_y = 3$$



$$x=7 \quad y = -\frac{3}{7}x + 3$$

$$S = \int_{x=0}^7 \int_{y=0}^{-\frac{3}{7}x+3} \sqrt{1+3^2+3^2} \, dy \, dx$$

$$(0,3) \quad (7,0)$$

$$m = \frac{3-0}{0-7} = -\frac{3}{7}$$

$$y = mx + b$$

$$y = -\frac{3}{7}x + 3$$

$$S = \int_{x=0}^7 \int_{y=0}^{-\frac{3}{7}x+3} \sqrt{19} \, dy \, dx$$

$$S = \sqrt{19} \int_{x=0}^7 \int_{y=0}^{-\frac{3}{7}x+3} dy \, dx$$

$$S = \sqrt{19} \int_{x=0}^7 [y]_{y=0}^{-\frac{3}{7}x+3} dx$$

$$S = \sqrt{19} \int_{x=0}^7 \left[ -\frac{3}{7}x + 3 - 0 \right] dx$$

$$S = \sqrt{19} \left[ -\frac{3}{7} \cdot \frac{x^2}{2} + 3x \right]_{x=0}^{x=7}$$

$$S = \sqrt{19} \left[ -\frac{3}{14}x^2 + 3x \right]_{x=0}^{x=7}$$

$$S = \sqrt{19} \left[ -\frac{3}{14}(7)^2 + 3(7) - \left( -\frac{3}{14}(0)^2 + 3(0) \right) \right]$$

$$S = \sqrt{19} \left[ -\frac{3}{14} \cdot 49 + 21 \right]$$

$$S = \sqrt{19} \left[ -\frac{3}{2} \cdot 7 + 21 \right]$$

$$S = \sqrt{19} \left[ -\frac{21}{2} + \frac{42}{2} \right]$$

$$S = \frac{21\sqrt{19}}{2}$$