

Name Kay

Turn OK
 First @ 12:15
 Median 27mi
 (allowed two
 more times)

8

1. The range (in yards) of a large gun (distance to where the shell hits) is given by the formula $R = 8000 \sin(2\theta)$, $0 \leq \theta \leq \pi/2$, where θ is the angle of elevation of the barrel above the horizontal. What angle will give the maximum range? What is the maximum range?

$$\frac{dR}{d\theta} = 8000 \cos(2\theta) \cdot 2 = 0$$

$$\cos 2\theta = 0$$

$$2\theta = \frac{\pi}{2}$$

$$\theta = \frac{\pi}{4} \text{ rad}$$

$$R = (8000 \sin \frac{\pi}{2}) = (8000) \text{ yds}$$

$\frac{12}{22}$
 got it
 most clear

8

2. Find the general antiderivative of each of the following.

a. $x^2 - 3x + 5$

$$\frac{x^3}{3} - \frac{3x^2}{2} + 5x + C$$

almost all

$\frac{15}{22}$

b. $2 \sin(4x)$

$$-\frac{2 \cos 4x}{4} + C = -\frac{1}{2} \cos 4x + C$$

most got!

6

3. Solve for y as a function of x :

$\frac{dy}{dx} = 3x^2$, where $y = 4$ when $x = 1$.

$$y = x^3 + C$$

$$4 = 1 + C$$

$$C = 3$$

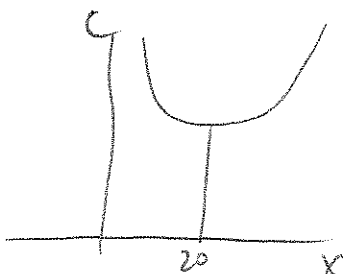
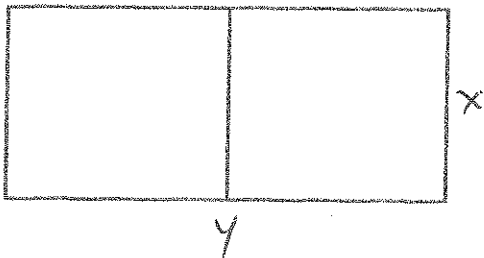
$$y = x^3 + 3$$

15/22

5 Josh

8

4. A corral is to be built as shown in the diagram. The outer fence costs \$10 per foot. The inner fence is lighter, and only costs \$5 per foot. The corral has to be 500 ft². What dimensions will give the least cost?



$$xy = 500$$

$$C = 10(2x + 2y) + 5x$$

$$= 20x + 20y + 5x$$

$$= 25x + 20y$$

$$y = \frac{500}{x}$$

$$C = 25x + 20\left(\frac{500}{x}\right)$$

$$= 25x + 10,000x^{-1}$$

$$\frac{dC}{dx} = 25 - 10,000x^{-2} = 0$$

$$\frac{25x^2 - 10,000}{x^2} = 0$$

$$x^2 = \frac{10,000}{25} = 400$$

$$x = 20$$

$$y = \frac{500}{20} = 25$$

$$20 \times 25'$$

$\frac{13}{22}$