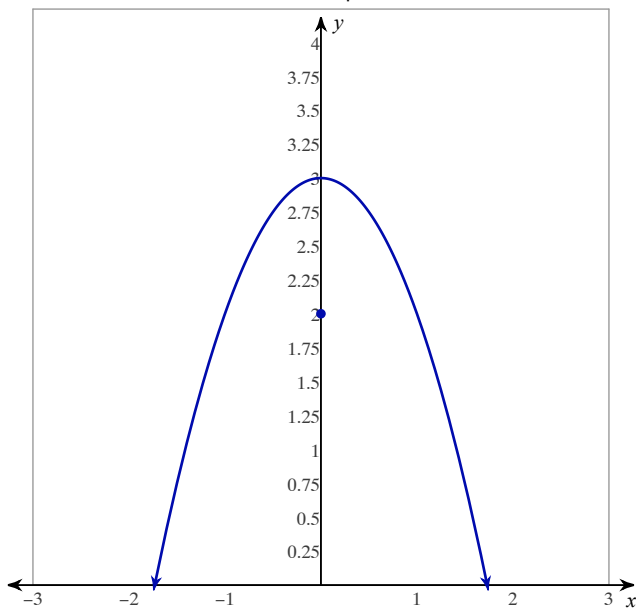


Solve each optimization problem.

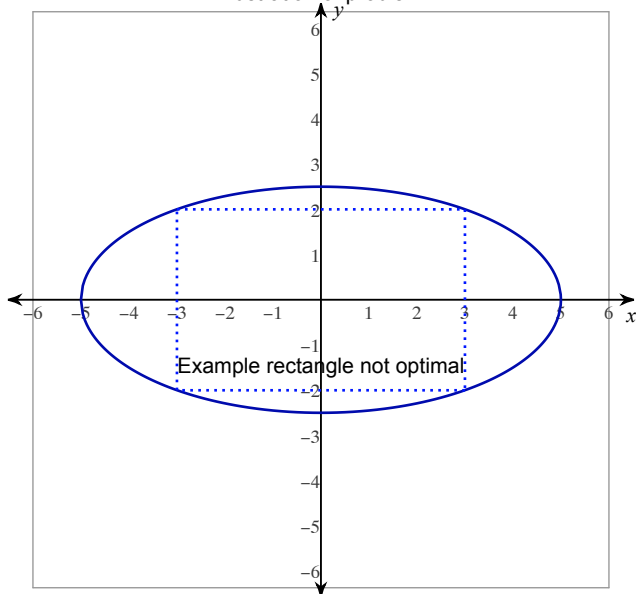
- 3) Which points on the graph of $y = 3 - x^2$ are closest to the point $(0, 2)$?

Illustration of problem



- 4) A geometry student wants to draw a rectangle inscribed in the ellipse $x^2 + 4y^2 = 25$. What is the area of the largest rectangle that the student can draw?

Illustration of problem



For each problem, find a linear approximation of the given quantity.

5) $\sqrt[3]{8.4}$

6) $\sin 92^\circ$

Answers to WEEK 4 - Unit 3 Review HW! (ID: 1)

1) $A =$ area of square $x =$ length of diagonals $t =$ time

$$\text{Equation: } A = \frac{x^2}{2} \quad \text{Given rate: } \frac{dx}{dt} = 2 \quad \text{Find: } \left. \frac{dA}{dt} \right|_{x=4}$$

$$\left. \frac{dA}{dt} \right|_{x=4} = x \cdot \frac{dx}{dt} = 8 \text{ m}^2/\text{min}$$

2) $V =$ volume of material in cone $h =$ height $t =$ time

$$\text{Equation: } V = \frac{\pi h^3}{12} \quad \text{Given rate: } \frac{dh}{dt} = 4 \quad \text{Find: } \left. \frac{dV}{dt} \right|_{h=6}$$

$$\left. \frac{dV}{dt} \right|_{h=6} = \frac{\pi h^2}{4} \cdot \frac{dh}{dt} = 36\pi \text{ cm}^3/\text{sec}$$

3) $\left(-\frac{\sqrt{2}}{2}, \frac{5}{2}\right), \left(\frac{\sqrt{2}}{2}, \frac{5}{2}\right)$

4) 25

5) $\frac{61}{30} \approx 2.0333$

6) 1