Calculus	Name	ID: 1
WEEK 4 - Unit 3 Review HW!	Date	Period
Solve each related rate problem.		

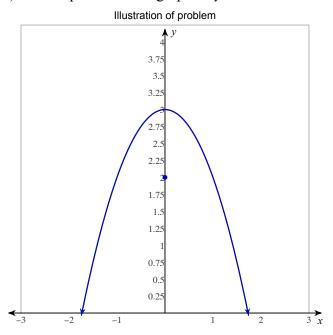
1) A hypothetical square grows so that the length of its diagonals are increasing at a rate of 2 m/min. How fast is the area of the square increasing when the diagonals are 4 m each?

2) A conical paper cup is 20 cm tall with a radius of 10 cm. The cup is being filled with water so that the water level rises at a rate of 4 cm/sec. At what rate is water being poured into the cup when the water level is 6 cm?

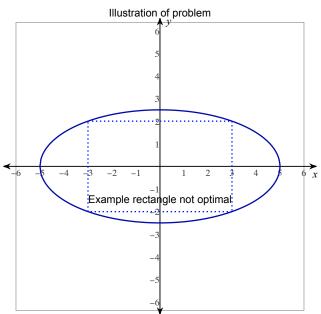
-1-

Solve each optimization problem.

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



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?



-2-

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

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

6) sin 92°

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

1) A = area of square x = length of diagonals t = timeEquation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 2$ Find: $\frac{dA}{dt}\Big|_{x=4}$ $\frac{dA}{dt}\Big|_{x=4} = x \cdot \frac{dx}{dt} = 8 \text{ m}^2/\text{min}$ 2) V = volume of material in cone h = height t = timeEquation: $V = \frac{\pi h^3}{12}$ Given rate: $\frac{dh}{dt} = 4$ Find: $\frac{dV}{dt}\Big|_{h=6}$ $\frac{dV}{dt}\Big|_{h=6} = \frac{\pi h^2}{4} \cdot \frac{dh}{dt} = 36\pi \text{ cm}^3/\text{sec}$ 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