Lesson 3

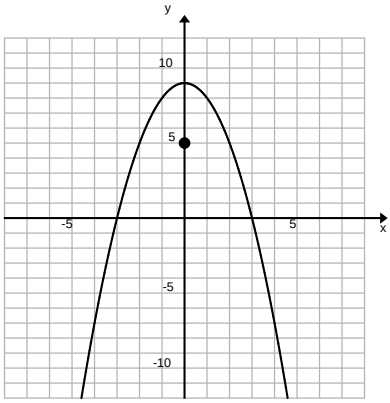
# *More Maximum and Minimum Geometric Problems*

**Objectives:** Solve Geometric problems

**Skills:** Find the distance between two points. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

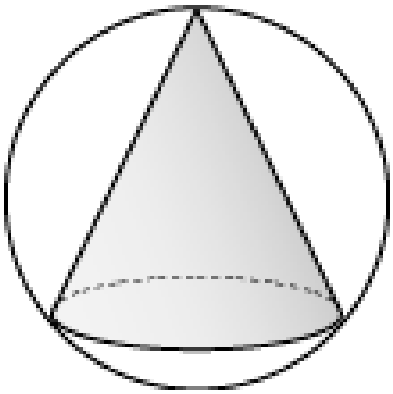
- Find the distance between:
  - $P_1$ (3,2) and $P_2$ (-2,10)
  - $P_1$ (-1,-3) and $P_2$ (2,8)
- Do you need the square root to determine the max or min distance?

1. Find the points on the graph of $y = 9 - x^2$ that are closest to the point (0, 5).

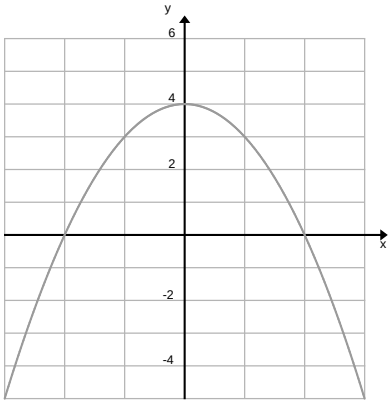



2. Find the point on the parabola $x = y^2$ that is closest to the point (0 , 3)

3. Find the volume of the largest right circular cone that can be inscribed in a sphere of radius 30 cm.



4. Find the maximum area of a trapezoid inscribed in the function $y = 4 - x^2$ if the trapezoid has its longer base on the $x$-axis.



**Homework:**

**1.** Find the point on the parabola $y = 6 - x^2$ that is closest to the point (0 , 3)

**2.** If an isosceles triangle is inscribed in a circle of radius 4 cm, find the dimensions of the isosceles triangle of maximum area.

**3.** Find the maximum volume of the largest right circular cone that can be inscribed in a sphere of radius 12 cm.

**4.** Find the dimensions of the right circular cylinder of largest volume that can be inscribed in a sphere of radius 30 cm.

**5.** Find the dimensions of a rectangle of maximum area inscribed in a circle of radius 6 cm.

**Solutions**

1. $\left(\sqrt{2\tfrac{1}{2}}, 3\tfrac{1}{2}\right), \left(-\sqrt{2\tfrac{1}{2}}, 3\tfrac{1}{2}\right)$

2. The height of the triangle is 6 cm and the base is $4\sqrt{3}$ cm.

3. The maximum volume is $\dfrac{2048}{3}\pi\ cm^3$

4. The radius of the right circular cylinder is $10\sqrt{6}$ cm and the height is $20\sqrt{3}$ cm.

5. The dimensions are $6\sqrt{2}$ cm by $6\sqrt{2}$ cm.

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HW – Applications of Derivatives.