# 12th Grade Assignment – Week #19

## Group Assignments:

*for Tuesday*

- Do **Problem Set #4** (*Calculus – Part II*), pr #2, 4.
  Note: I will go over both of these problems in this week's Lecture #2.

*for Thursday*

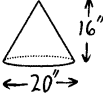- Do **Problem Set #4** (*Calculus – Part II*), pr #3, 5.

## Individual Work

- Finish any of the problems left from the (above) group assignments.
- Do **Problem Set #4** (*Calculus – Part II*), pr #1
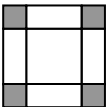- Do **Problem Set #5** (*Calculus – Part II*), pr #3.

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— Calculus – Part II —
# Problem Set #4

1) Find $\frac{dy}{dx}$.

   a) $y^2 - xy + 4x = 2$

   b) $x = x^2y$

   c) $x = \sin y$

   d) $y = \cos(5x^2)$

2) What are the dimensions of the rectangle with the largest area that fits in the region bounded by the x-axis and the curve $f(x) = \frac{1}{2}x^2 - 5$?

3) Find the dimensions of a 500m$\ell$ cylindrical can such that the least amount of material is used.

4) A trapezoid is such that three of its sides have the same length. What must its angles be in order that its area is then as large as possible?

5) What are the dimensions and volume of the cylinder with the greatest volume that fits inside this cone?



# Problem Set #5

1) An open box is to be made from a square piece of sheet metal (measuring 20 cm on each side) by cutting small squares off each of the corners of the original square and then folding up the sides. What is the largest possible volume that can be created?



2) A 50-foot-high Ferris wheel makes exactly four rotations every minute.

   a) What is the speed with which a passenger is gaining altitude when the passenger is $\frac{1}{8}$ of a turn from the top?

   b) What is the maximum speed towards the ground of a passenger?

3) Find the dimensions of the cone with the largest possible volume that fits inside a sphere that has a 6 cm radius.

4) An ellipse has the equation $9x^2 + y^2 = 9$.

   a) Graph the ellipse.

   b) Find $\frac{dy}{dx}$.

   c) Find the slope of the line tangent to the ellipse where $y = 2$ and x is positive.

   d) Find the dimensions of the rectangle inscribed inside the ellipse that has the largest possible area.

   e) What point on the ellipse is closest to the point (0,2)? How close is it?