Workshop Problems–October 12

1. The graph of the tilted ellipse $x^2 - xy + y^2 = 3$ is shown below. What are the dimensions and the location of the box containing the ellipse?

Note. The sides of the box are vertical and horizontal and also are tangent to the ellipse.



2. Find the largest circle centered on the positive y-axis which touches the origin and which is above $y = x^2$.



3. An object is moving along the parabola $y = 3x^2$.

a) When it passes through the point (2, 12), its "horizontal" velocity is $\frac{dx}{dt} = 3$. What is its "vertical" velocity at that instant?

- b) If it travels in such a way that $\frac{dx}{dt} = 3$ for all t, then what happens to $\frac{dy}{dt}$ as $t \to +\infty$?
- c) If, however, it travels in such a way that $\frac{dy}{dt}$ remains constant, then what happens to $\frac{dx}{dt}$ as $t \to +\infty$?