Examples 5.3 – Implicit Differentiation and Inverse Functions

1. Determine the following derivatives. Assume that y is a function of x.

   Solution: (a) $\frac{d}{dx}\left(x^2\right)=$

   (b) $\frac{d}{dx}\left(y^2\right)=$

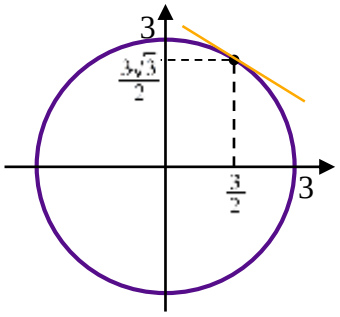
   (c) $\frac{d}{dx}\left(x^2\sqrt{y}\right)=$

2. As the volume V of a sphere changes over time t, its radius r also changes. Given that the volume of a sphere is $V=\frac{4}{3}\pi r^3$, find a formula for the rate of change of the radius with respect to time.

   Solution:

3. Find the equation of the tangent line to the circle $x^2+y^2=9$ at $x_0=\frac{3}{2}$ in the first quadrant.

   Solution:



4. Find the inverse function for $y=f(x)=3x-7$.

   Solution: