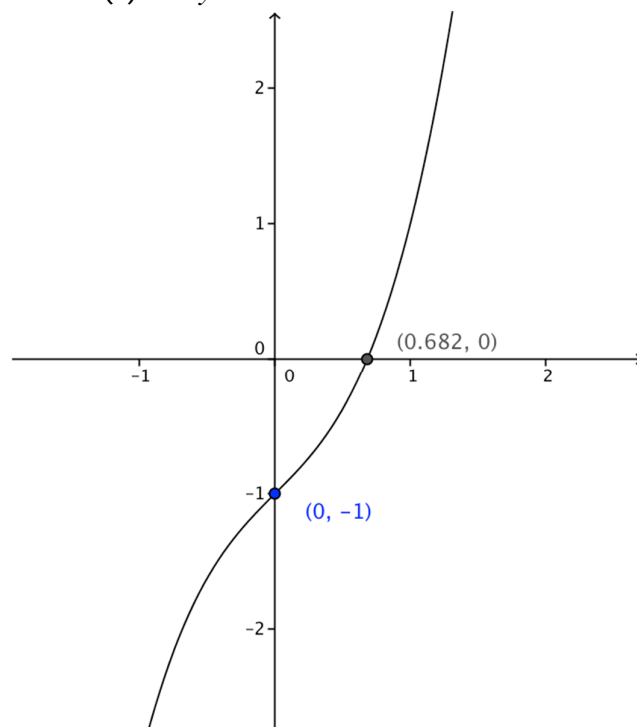


Tutorial 3A: Graphing Techniques (Part 1)

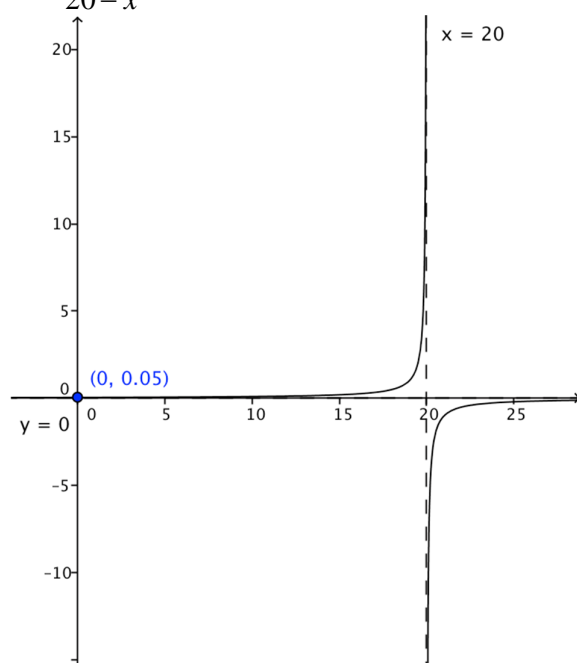
Curve Sketching, Conic Sections and Parametric Equations

Basic Mastery Questions

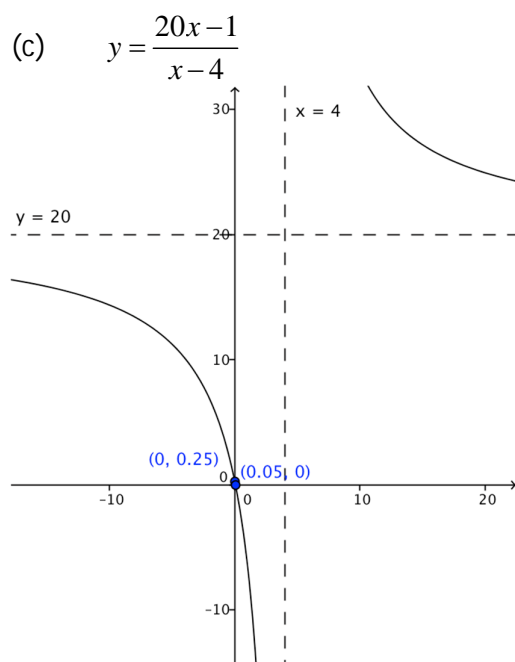
1 (a) $y = x^3 + x - 1$



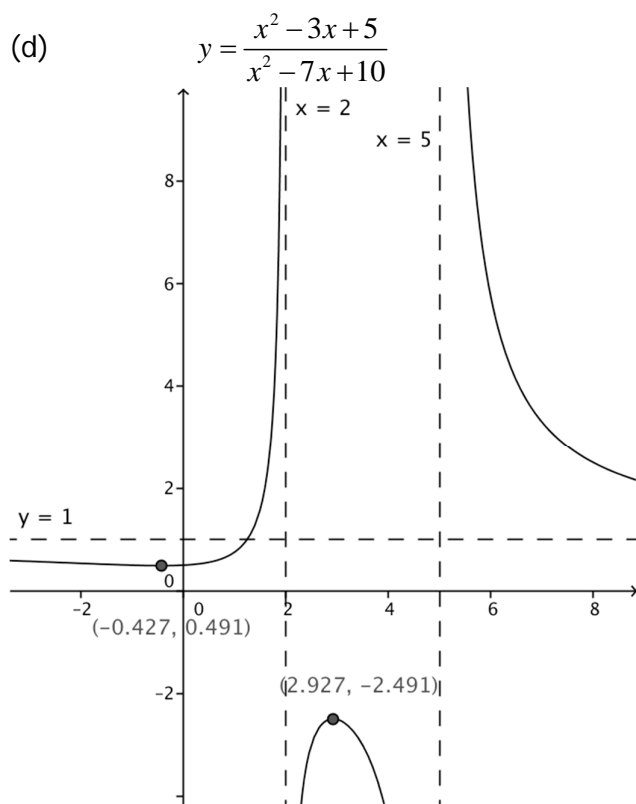
(b) $y = \frac{1}{20 - x}$



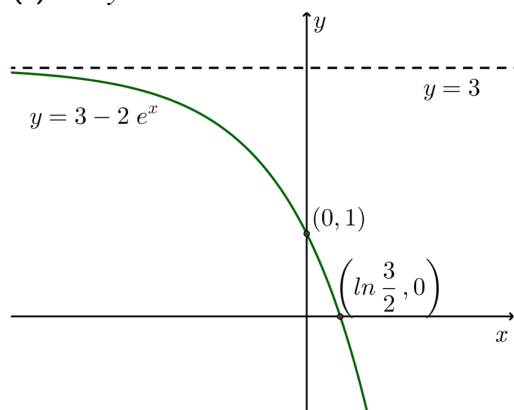
Lines of symmetry: $y = -x + 20$, $y = x - 20$



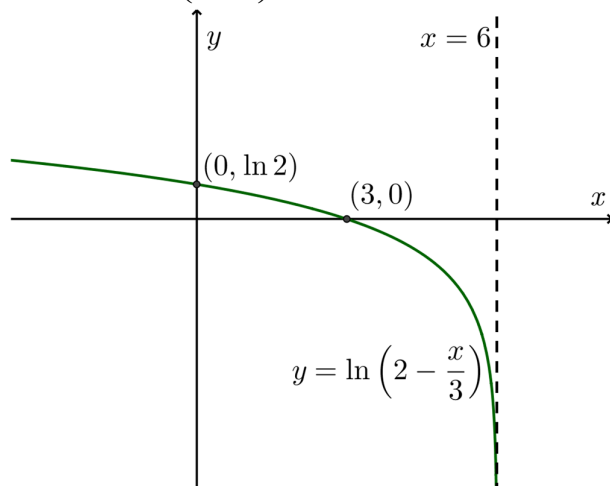
Lines of symmetry: $y = x + 16$, $y = -x + 24$

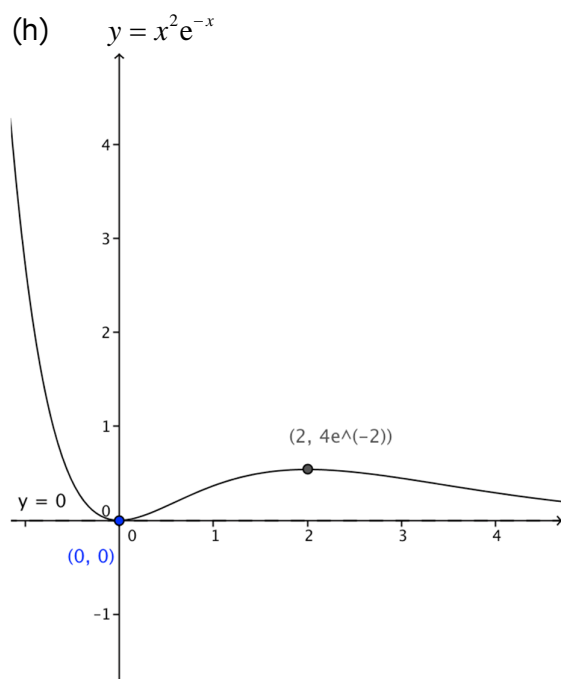
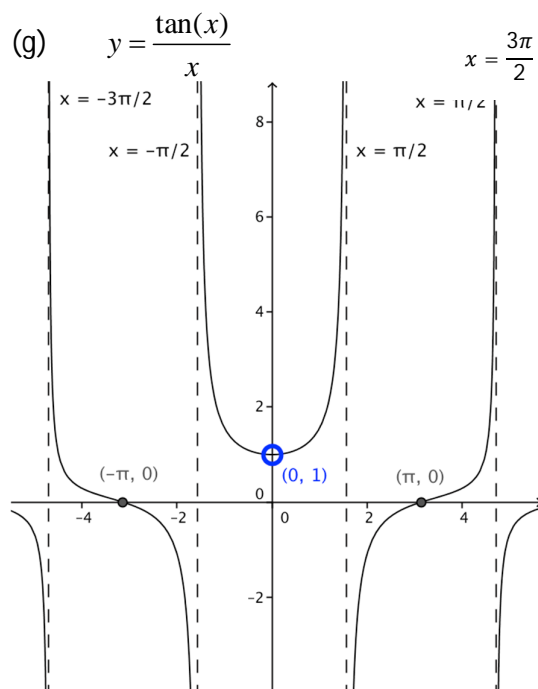


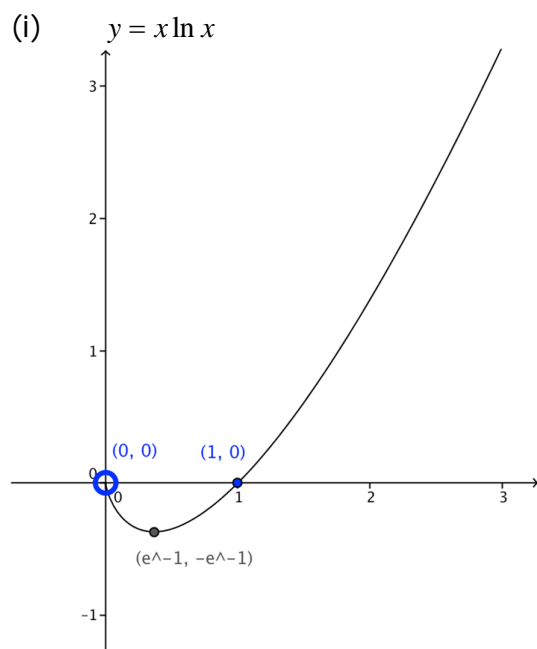
(e) $y = 3 - 2e^x$



(f) $y = \ln\left(2 - \frac{x}{3}\right)$

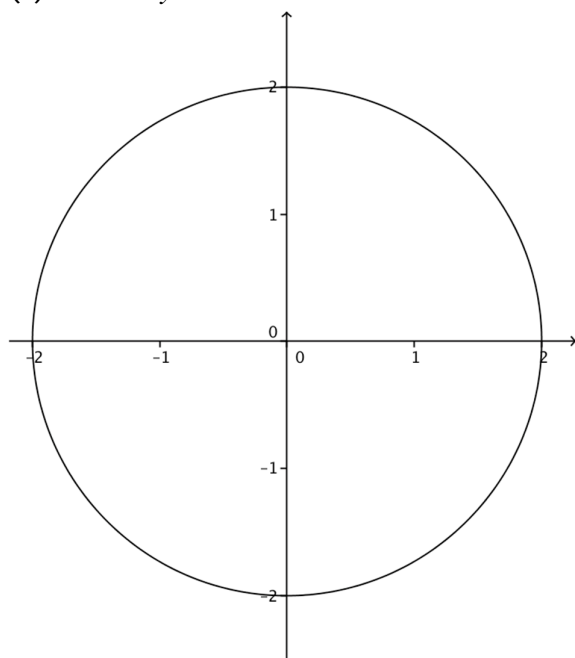






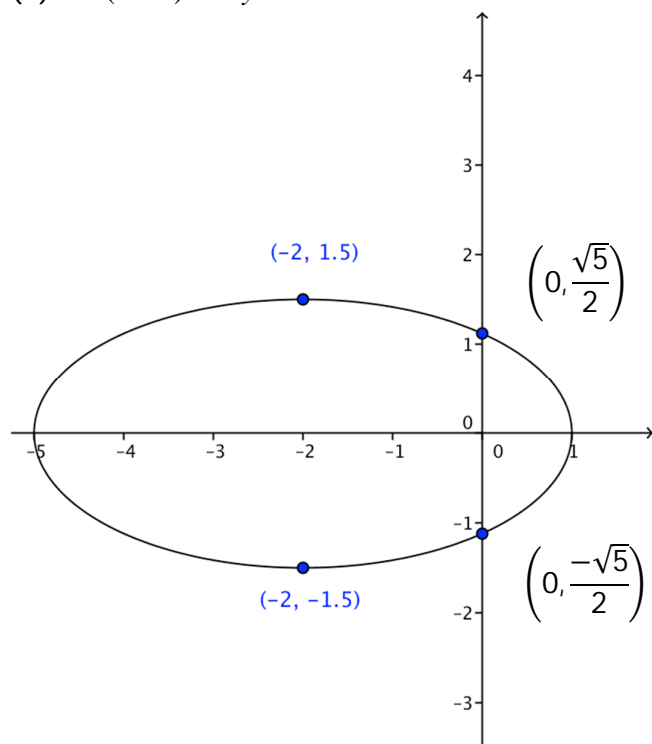
Note that the graph is not defined for $x = 0$.

2 (a) $x^2 + y^2 = 4$



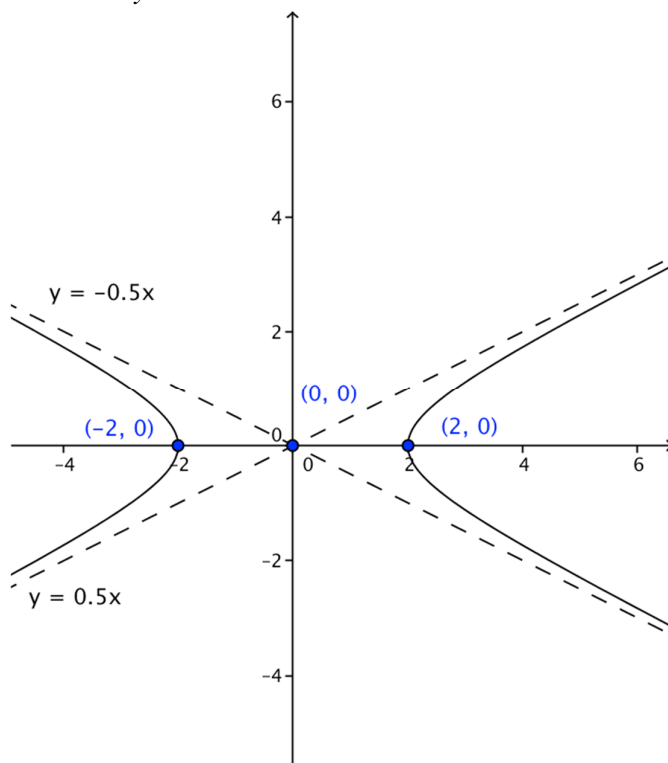
Lines of symmetry: $y = mx$ for any real number m , $x = 0$

(b) $(x+2)^2 + 4y^2 = 9$

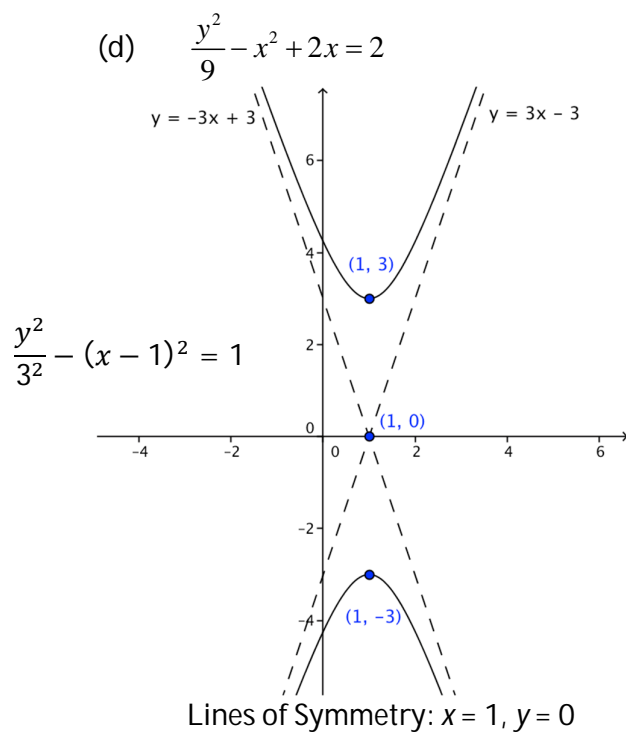


Lines of symmetry: $y = 0, x = -2$

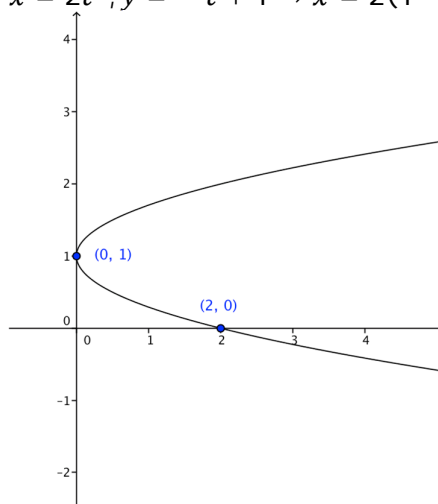
(c) $x^2 = 4 + 4y^2$



Lines of Symmetry: $x = 0, y = 0$



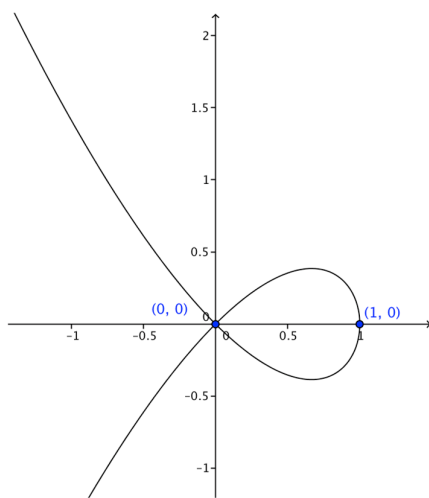
3. (a) $x = 2t^2, y = -t + 1 \rightarrow x = 2(1 - y)^2$



Lines of Symmetry: $y = 1$

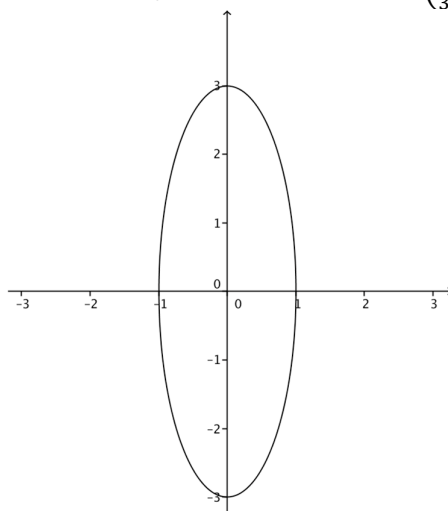
Note, this is actually a parabola and is another type of conic.

(b) $x = 1 - t^2, y = t(1 - t^2) \rightarrow y = \pm x\sqrt{1 - x}$



Lines of Symmetry: $y = 0$

(c) $x = \sin(t), y = 3 \cos(t) \rightarrow x^2 + \left(\frac{y}{3}\right)^2 = 1$



Lines of Symmetry: $x = 0, y = 0$

(d) $x = 2 \sec(t), y = 3 \tan(t) \rightarrow 1 + \left(\frac{y}{3}\right)^2 = \left(\frac{x}{2}\right)^2$

