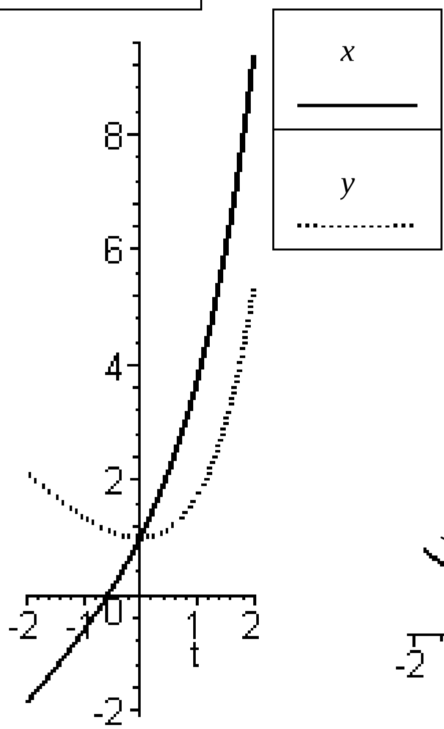
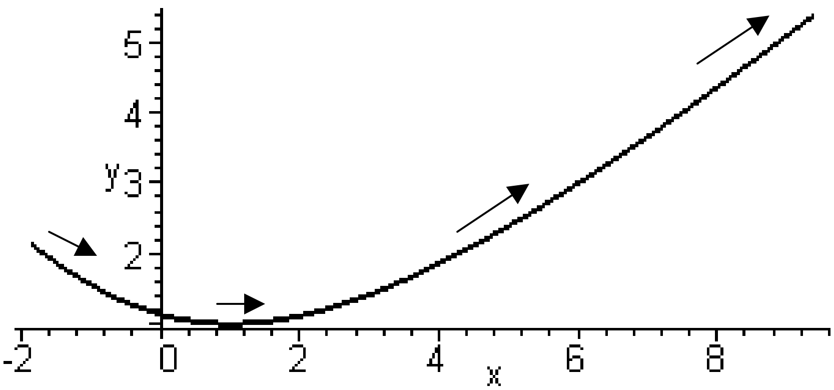
4) $x = e^{-t} + t \quad y = e^{t} - t \quad -2 \le t \le 2$

Regular Plot



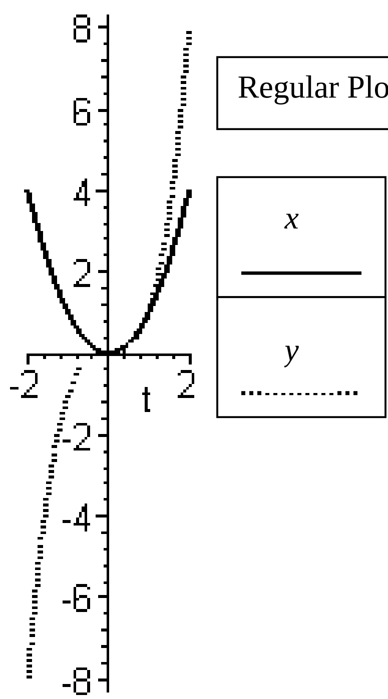
Parametric Plot



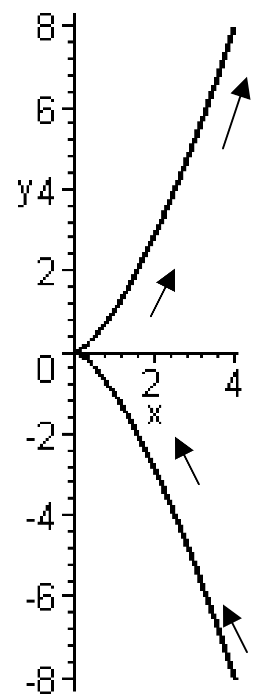
8) $x = t^2 \quad y = t^3$

Part a)

Regular Plot



Parametric Plot



Part b) Since we need a function where domain is $(-\infty, \infty)$, we need to set up x as a function of y.

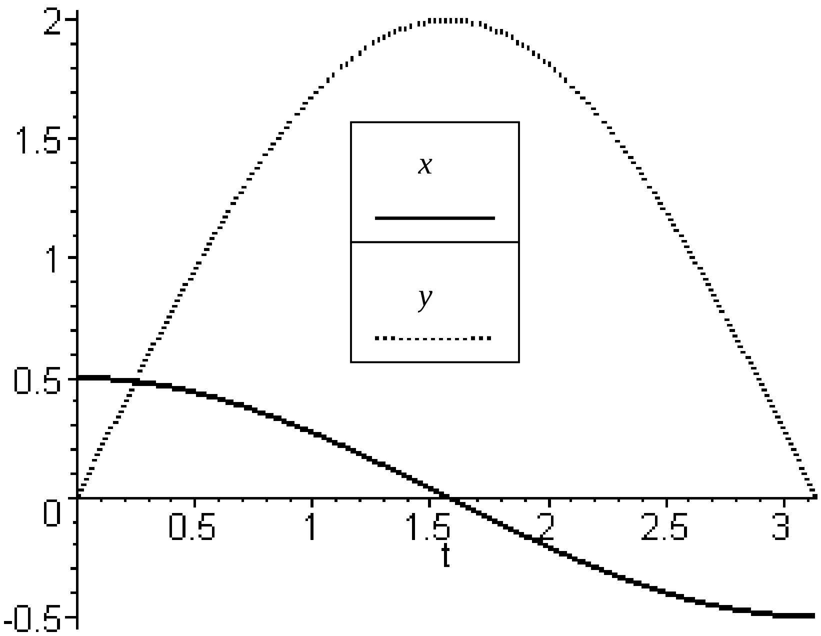
$$t = \sqrt[3]{y} \quad \Rightarrow \quad x = \left(\sqrt[3]{y}\right)^2 = y^{\frac{2}{3}}$$

10) $x = \frac{1}{2}\cos\theta \quad y = 2\sin\theta \quad 0 \le \theta \le \pi$

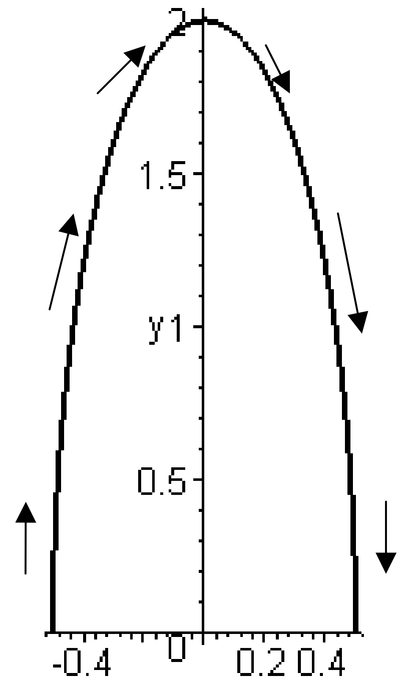
Part a) $x = \frac{1}{2}\cos(0) = \frac{1}{2} \quad x = \frac{1}{2}\cos(\pi) = \frac{-1}{2} \quad \begin{matrix} 2x = \cos\theta \\ \theta = \cos^{-1}(2x) \end{matrix} \quad y = 2\sin(\cos^{-1}(2x)) \quad \frac{-1}{2} \le x \le \frac{1}{2}$

Part b)

Regular Plot



Parametric Plot

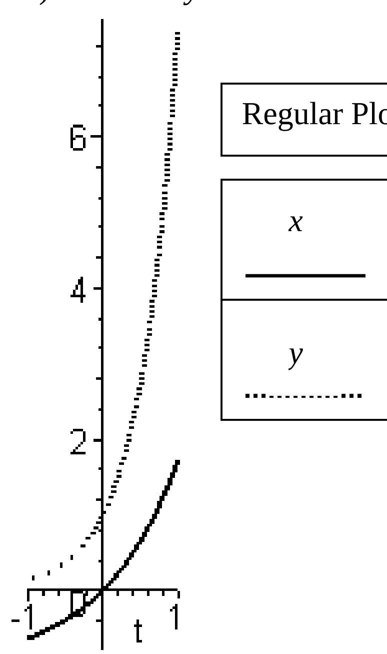


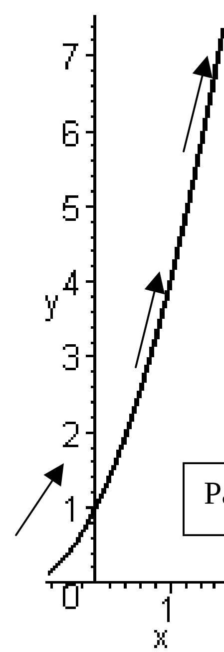
12) $x = e^t - 1 \quad y = e^t$

Part a) $x + 1 = e^t \quad \Rightarrow \quad \ln(x+1) = t \quad \Rightarrow \quad y = e^{2(\ln(x+1))} = e^{\ln(x+1)^2} = (x+1)^2$

Part b)

Regular Plot





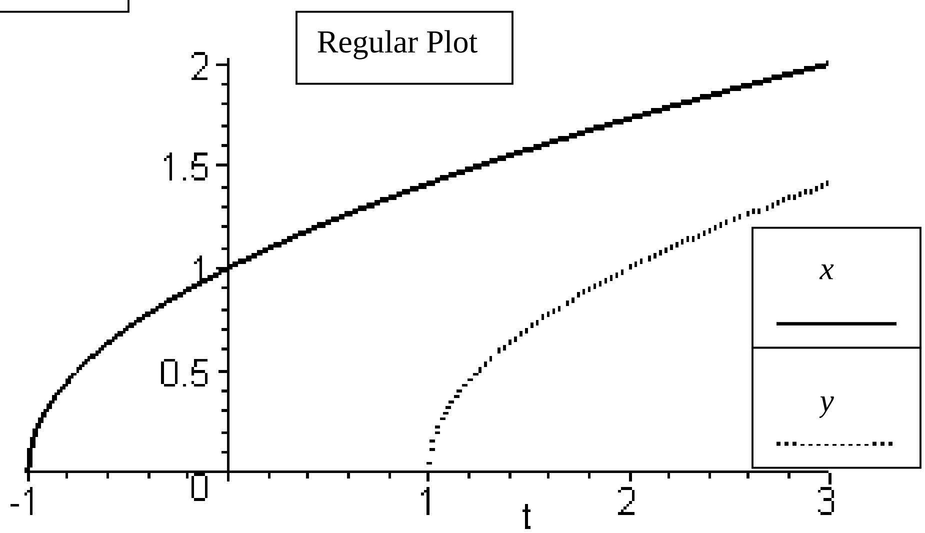
Parametric Plot

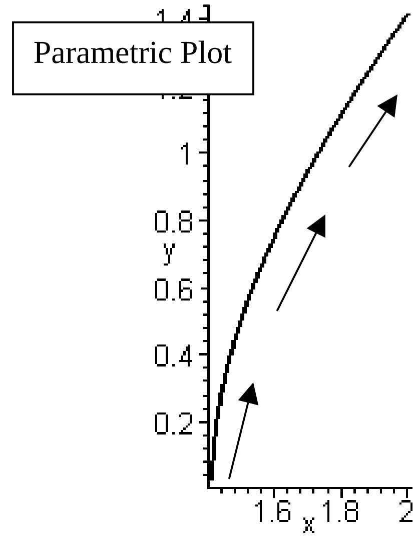
14) There is an error in this question, it should be $x=\sqrt{t+1}\quad y=\sqrt{t-1}$

Part a) $x^2=t+1 \;\Rightarrow\; x^2-1=t \;\Rightarrow\; y=\sqrt{(x^2-1)-1}=\sqrt{x^2-2}$

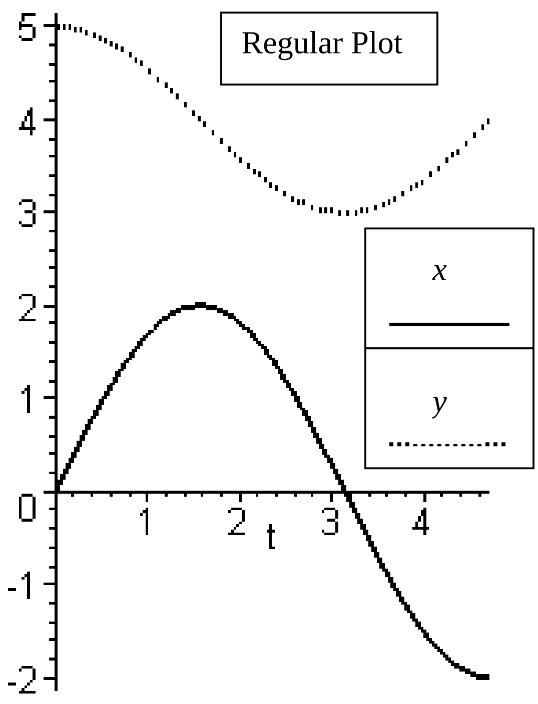
Since the domain of $x=\sqrt{t+1}\quad y=\sqrt{t-1}$ is $[1,\infty)$, the domain for the $y=\sqrt{x^2-2}$ is $[\sqrt{2},\infty)$.

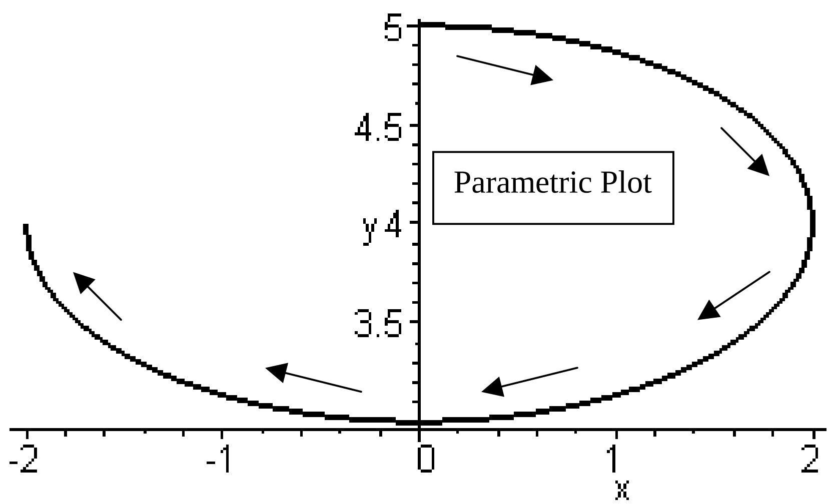
Part b)





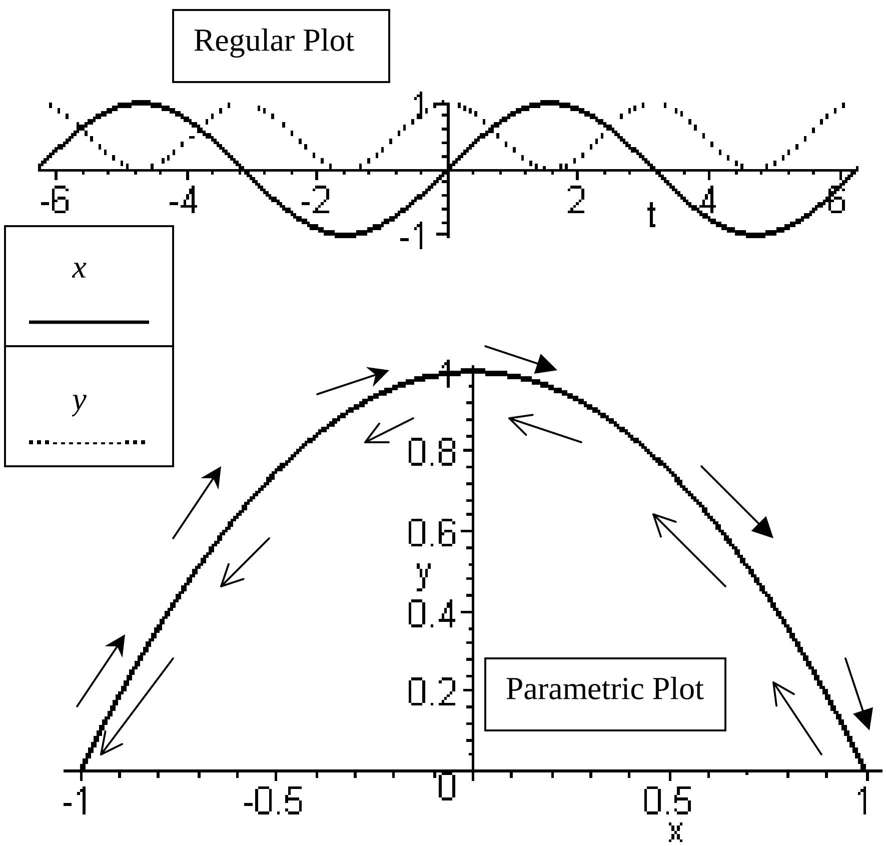
16) $x=2\sin t\quad y=4+\cos t\quad 0\le t\le \frac{3\pi}{2}$





Note: the horizontal axis is not the equation $y=0$

18) $x = \sin t \quad y = \cos^2 t \quad -2\pi \le t \le 2\pi$



This plot starts at point $(0,1)$. From -2π to $\frac{-3\pi}{2}$, the graph moves to the right and ending up at point $(1,0)$. The arrow set: $\longrightarrow$

From $\frac{-3\pi}{2}$ to $-\pi$, the graph moves back to point $(0,1)$. From $-\pi$ to $\frac{-\pi}{2}$, the graph continues to move left ending up at point $(-1,0)$. The arrow set: $\longrightarrow$

From $\frac{-\pi}{2}$ to 0, the graph changes direction and retraces the previous path returning to point $(0,1)$. The arrow set: $\longrightarrow$

This mound shape is repeated again in $[0,2\pi]$.

20)