Problem 1: Sketch the following parametric curves.

1. $x = 2t + 1$, $y = t^2 + 1$, $t \in \mathbb{R}$.

2. $x = 1 + \sin\theta$, $y = -1 + 2\cos\theta$, $0 \le \theta \le 2\pi$.

3. $x = 2 + 2\sec\theta$, $y = 1 + 4\tan\theta$, $\theta \in (-\pi/2, \pi/2) \bigcup (\pi/2, 3\pi/2)$.

4. $x = t$, $y = 4 - t$, $0 \le t \le 4$.

Problem 2: Eliminate the parameter to find the cartesian equation for the following parametric curves.

1. $x = \sqrt{t}$, $y = 1 - t$.

2. $x = t^2$, $y = \ln t$.

3. $x = t^2$, $y = t^3$.

Problem 3: Find the parametric equation of the following conic sections.

1. A parabola with vertex at $(2, 2)$ and focus at $(3, 2)$.

2. An ellipse with center at $(-1, 4)$, a vertex at $(-1, 0)$ and a focus at $(-1, 6)$

3. A hyperbola with foci at $(2, 0)$, $(2, 8)$ and asymptotes $y = 3 + \frac{1}{2}x$, $y = 5 - \frac{1}{2}x$.