MATH 1700 Problem Workshop 11

Find lengths of the following curves

1. (a) $24xy = x^4 + 48$ from $(2, 4/3)$ to $(3, 43/24)$
   (b) $y = \ln(\cos x)$ from $x = 0$ to $x = \pi/4$.
2. (a) $x = t^2 \sin t, \quad y = t^2 \cos t, \quad 0 \le t \le 2\pi$
   (b) $x = 1 + t^3, \quad y = 1 - t^2, \quad -1 \le t \le 2$
3. (a) the cardioid $r = 1 + \cos\theta$. (Hint: $1 + \cos\theta = 2\cos^2(\theta/2)$.
   (b) $r = \theta^2$ from $x = 0$ to $x = \pi$.
4. Set up but do not evaluate a definite integral to find the length of the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

   using

   (a) Cartesian coordinates
   (b) Parametric coordinates