Math 143 Midterm 2

Name: _____

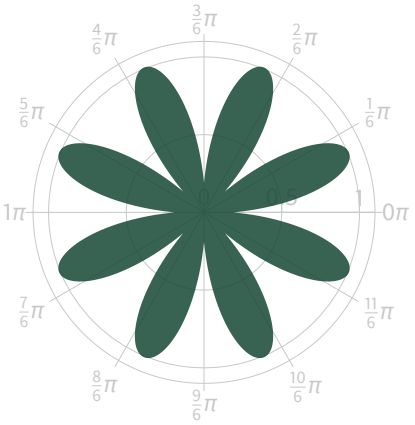
Identities: $\cos^2 t = (1+\cos 2t)/2, \sin^2 t = (1-\cos 2t)/2$.

1. Find the values of t for which the parametric curve $\begin{cases} x = 2t^2 \\ y = t^4 - t^3/3 \end{cases}$ for $t \in \mathbb{R}$ is concave down.

2. Find the plane containing the lines $\begin{cases} x = 2 + t, \\ y = 1 + t, \\ z = -2 + 2t \end{cases}$ for $t \in \mathbb{R}$ and $\begin{cases} x = s, \\ y = 1 + s, \\ z = 1 + 2s \end{cases}$ for $s \in \mathbb{R}$.

3. Find the equation of the line tangent to the polar curve $r = 1/(1+\cos\theta)$ at $\theta = \pi/2$.

4. Find the area enclosed by the polar curve $r = \sin(4\theta)$.



5. Find the arclength of the parametric equations $\begin{cases} x = \cos(2t), \\ y = 2t - \sin(2t) \end{cases}$ for $t \in [0, \pi]$.