Problem 1: Reduce the following equations to one of the standard forms, classify the surface, and sketch it.

1. $4x^2 + y + 2z^2 = 0$
2. $x^2 + 2y - 2z^2 = 0$
3. $y^2 = x^2 + 4z^2 + 4$
4. $x^2 + y^2 - 2x - 6y - z + 10 = 0$
5. $x^2 - y^2 - z^2 - 4x - 2z + 3 = 0$
6. $x^2 - y^2 + z^2 - 4x - 2z = 0$
7. $4x^2 + y^2 + z^2 - 24x - 8y + 4z + 55 = 0$
8. $x^2 - 2x + 2y - 1 = 0$

Problem 2: Sketch the following curves.

1. $\vec{r}(t) = t\,\hat{i} + 2\sin t\,\hat{j} + \cos t\,\hat{k}$
2. $\vec{r}(t) = 2\cos t\,\hat{i} + t\,\hat{j} + \sin t\,\hat{k}$