1. Prepquiz 1

Problem 1: Consider the trajectories of two particles, the first moves according to

$$\vec{r}_1(t) = (-5t^2 + 50t)\vec{k} + t\vec{i}$$

where t denotes time and the second moves according to

$$\vec{r}_2(t) = (-5t^2 + 50t)\vec{k} + t\vec{i} + 2\vec{i}$$

a) Is there a time where these two particles meet, if yes, when?
b) Do the two curves described by these two motions intersect and if yes, where?

Problem 2: A curve is given in terms of

$$\vec{r}(t) = \cos t\vec{i} + \sin t\vec{j} + e^t\vec{k} \ ,$$

where $0 \leq t \leq 2\pi$. Compute the curvature of the curve at every point.

Problem 3: Sketch the quadrics given by the equations

$$a)\ 4x^2 + \frac{y^2}{4} + z^2 = 1 \ ,$$

$$b)\ 4x^2 - \frac{y^2}{4} + z^2 = 1 \ ,$$

and

$$c)\ 4x^2 - \frac{y^2}{4} - z^2 = 1 \ .$$