

HWK #3

- 1) Find the distance between the parallel planes $3x + 6y - 9z = 4$ and $x + 2y - 3z = 1$

- 2) a) Find the traces of the surface $z^2 = x^2 + y^2$ in the planes $x = k$, $y = k$ and $z = k$.
b) Use those traces to sketch the graph of the two functions $f(x,y) = \sqrt{x^2 + y^2}$ and $f(x,y) = -\sqrt{x^2 + y^2}$.

- 3) Suppose we have the plane curve $\mathbf{r}(t) = \sec(t)\mathbf{i} + \tan(t)\mathbf{j}$.
 - a) Sketch the curve .
 - b) Find $\mathbf{r}'(t)$.
 - c) Sketch the tangent vector $\mathbf{r}'(t)$ at the point of the curve reached when $t = \frac{\pi}{4}$.

- 4) Find the points of intersection of the tangent lines to the curve $\mathbf{r}(t) = \sin(\pi t)\mathbf{i} + 2\sin(\pi t)\mathbf{j} + \cos(\pi t)\mathbf{k}$ at the points where $t = 0$ & $t = \frac{1}{2}$.

- 5) Reparametrize the curve $\mathbf{r}(t) = \langle \cos(t), \sin(t), 1 \rangle$ with respect to the arc length measurement from the point $t = 0$ in the direction of increasing t .

- 6) Given $\mathbf{r}(t) = t^2\mathbf{i} + 2t\mathbf{j} + \ln(t)\mathbf{k}$.
 - a) Find $\mathbf{T}(t)$.
 - b) Find $\mathbf{N}(t)$.
 - c) Use formula 9 to find **curvature** .