Lecture 18: Tangent plane, directional derivative

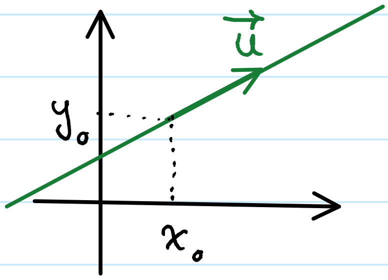
Wednesday, November 2, 2016 8:50 AM

$x_0^2+y_0^2-z_0^2=-1$. So $\left(\frac{c}{2}\right)^2+c^2-\left(\frac{-3c}{2}\right)^2=-1$, which implies

$\left(\frac{1}{4}+1-\frac{9}{4}\right)c^2=-1$. Thus $c^2=1$, and so $c=\pm 1$.

Therefore there are two points at which $(1,2,3)$ is a normal vector of the tangent plane: $\pm\left(\frac{1}{2},1,\frac{-3}{2}\right)$

- Yet another application of chain rule is in finding the rate of change of f in a given direction. It is called the directional derivative of f in the direction $\vec{u}$.



We would like to know how fast f is changing if (x_0,y_0) changes in the direction of $\vec{u}$. So we need to parametrize the the line which is parallel to $\vec{u}$ and passes through (x_0,y_0). And then compute $\frac{d}{dt}(f\circ\vec{r})$. Let's point out that, since we care about direction, we assume $\vec{u}$ is unit.

$\vec{r}(t)=(x_0,y_0)+t\,\vec{u}$ is the parametrization of the green light (with the constant speed $=1$).