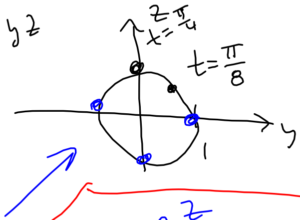
$\langle -\frac{13}{4}, \frac{5}{4}, 0 \rangle = \frac{1}{4} \langle -13, 5, 0 \rangle$

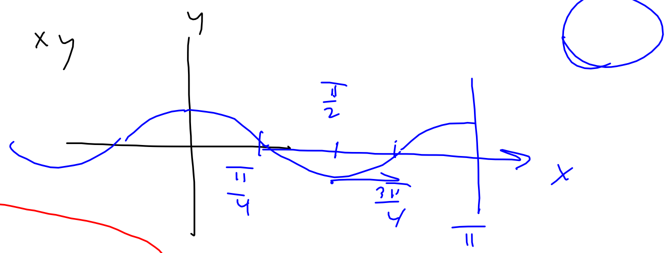
$t \langle \frac{11}{4}, \frac{1}{4}, 1 \rangle = \frac{1}{4} t \langle 11, 1, 4 \rangle$

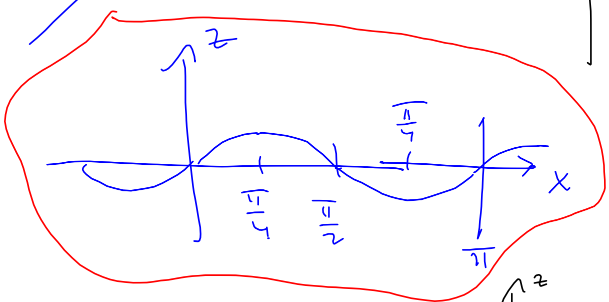
Test 1 -Tuesday

§13.1 #9, 17,

(9) $\langle t, \cos(2t), \sin(2t) \rangle$

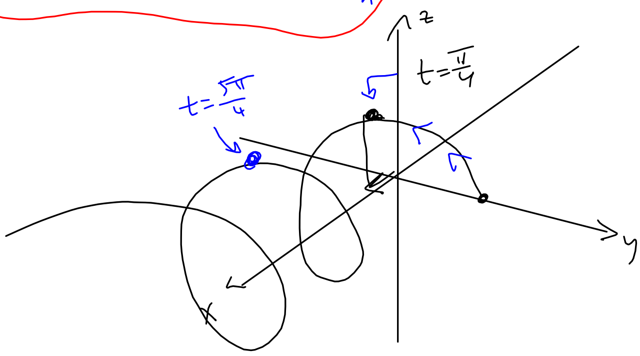






$t=0: \langle 0, 1, 0 \rangle$

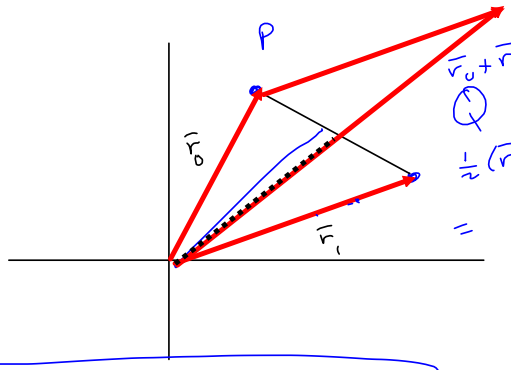
$t=\frac{\pi}{4}: \langle \frac{\pi}{4}, 0, 1 \rangle$



$P(1,-1,2)$, $Q(4,1,7)$

$\bar{r}_0 = \langle 1,-1,2\rangle$, $\bar{r}_1 = \langle 4,1,7\rangle$

$\bar{r}(t) = (1-t)\,\bar{r}_0 + t\,\bar{r}_1 \quad 0 \le t \le 1$

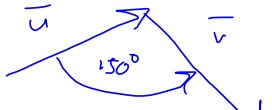


$\frac{1}{2}(\bar{r}_0+\bar{r}_1)$ =

$\bar{r}\left(\frac{1}{2}\right) = \frac{1}{2}\bar{r}_0 + \frac{1}{2}\bar{r}_1$ ugh!

$= \frac{1}{2}(\bar{r}_0+\bar{r}_1)$

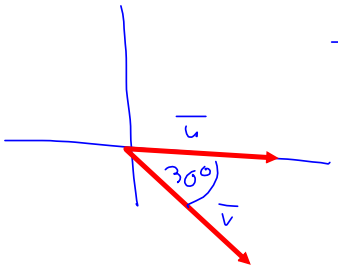
S 12.4 # 15



Not std position.

is $\bar{u}\times\bar{v}$ into or out of the page?

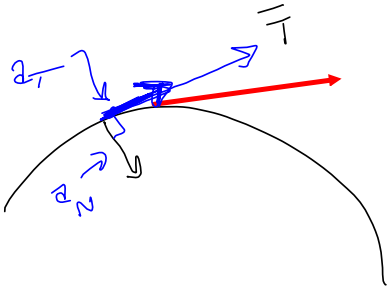
Standard Position



$\bar{u}\times\bar{v}$ is into the screen, by right-hand rule & hitchhiking.

§13.4 stuff

"Tangent & Normal Components of acceleration"



Lots of formulas, I'd just summarize that work with the expressions in terms of $\bar{r}$

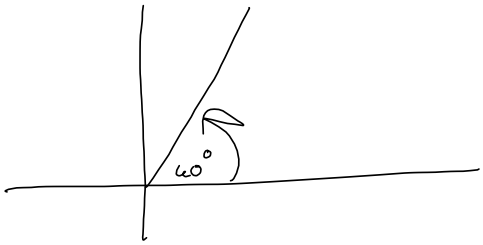
$$a_N = \frac{\|\bar{r}' \times \bar{r}''\|}{\|\bar{r}'\|}$$

2

$$a_T = \frac{\bar{r}' \cdot \bar{r}''}{\|\bar{r}'\|}$$

$h(t) = -\frac{1}{2}gt^2 + v_0 t + h_0$

§ 13.4 # ~~36~~ 26



Find muzzle velocity if max height is 500m

$\bar{v}$ = velocity = $\bar{r}'$

v = speed = $\|\bar{v}\| = \|\bar{r}'\|$

Then $\bar{r}(t) = \langle (v\cos 60^\circ)t, (v\sin 60^\circ)t - \frac{1}{2}gt^2 \rangle$ + $\bar{r}(0)$ → 0

↳ Take the derivative.

$v\sin 60^\circ t - \frac{1}{2}gt^2$ SET 500 & solve for t

$\frac{\sqrt{3}}{2}vt - \frac{1}{2}(9.8)t^2 = 500$

$-4.9t^2 + \frac{\sqrt{3}}{2}vt - 500 = 0$

$4.9t^2 - \frac{\sqrt{3}}{2}vt + 500 = 0$

~~$\bar{r}'(t) = 0$ when at the high point, so then,~~

the VERTICAL COMPONENT of $\bar{r}'$ is zero

$$v = \int a \, dt + C = \int a \, dt + v_0$$

$$\text{and } \vec{r} = \int \vec{v} \, dt + \vec{C} = \int \vec{v} \, dt + \vec{r}_0$$