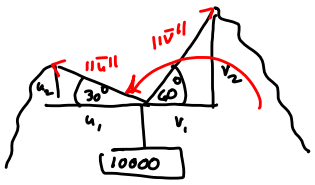
$3x^3 - 3x^2 - x + 1$

$= 3x^2(x-1) - 1(x-1)$ Factoring by Grouping

$= 3x^2 \,☺\, - 1\,☺$

$= ☺(3x^2 - 1)$

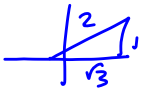
$= (x-1)(3x^2-1)$



Downward force = 10000 lbs ↓

$\langle 0, -10000 \rangle$

$\bar{u} + \bar{v} = \langle 0, +10000 \rangle$



$\bar{u} = \langle u_1, u_2 \rangle$, $\bar{v} = \langle v_1, v_2 \rangle$

$\frac{u_1}{\|\bar{u}\|} = -\cos 30^\circ \quad u_1 = -\|\bar{u}\| \cos 30^\circ$

$u_2 = \|\bar{u}\| \sin 30^\circ$

$\bar{u} = \langle -\|\bar{u}\| \cos 30^\circ, \|\bar{u}\| \sin 30^\circ \rangle$

$= \langle -ab, ac \rangle \qquad a = \|\bar{u}\|$

$\cos 30^\circ = b$

$\sin 30^\circ = c$

$\|\bar{u}\| = 5000$

$\|\bar{v}\| = 5000\sqrt{3}$

$\bar{v} = \langle \|\bar{v}\| \cos 60^\circ, \|\bar{v}\| \sin 60^\circ \rangle$

$= \langle de, df \rangle \qquad d = \|\bar{v}\|$

$e = \cos 60^\circ$

$f = \sin 60^\circ$

We Know

$\bar{u} + \bar{v} = \langle 0, 10000 \rangle$

$\langle -ab, ac \rangle + \langle de, df \rangle = \langle 0, 10000 \rangle$

Unknowns: a, d

$-ab + de = 0$

$ac + df = 10000$

$Ax + By = C$

$Dx + Ey = F$

$-ba + ed = 0$

$ca + fd = 10000$

$-ba = -ed$

$a = \frac{-ed}{-b} = \frac{ed}{b} = \frac{\frac{1}{2} \cdot 5000\sqrt{3}}{\frac{\sqrt{3}}{2}} = 5000$

$d\left(\frac{ed}{b}\right) + fd = 10000$

$d = \|\bar{v}\| \qquad a = \|\bar{u}\|$

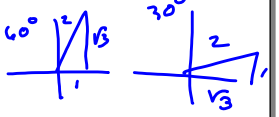
$e = \cos 60^\circ \qquad \cos 30^\circ = b$

$f = \sin 60^\circ \qquad \sin 30^\circ = c$

$\frac{ce}{b} d + fd = 10000$

$d\left[\frac{ce}{b} + f\right] = 10000$

$d = \frac{10000}{\frac{ce}{b} + f}$



$= \frac{10000}{\frac{(\frac{1}{2})(\frac{1}{2})}{\frac{\sqrt{3}}{2}} + \frac{\sqrt{3}}{2}} = \frac{10000}{\frac{\frac{1}{4}}{\frac{\sqrt{3}}{2}} + \frac{\sqrt{3}}{2}}$

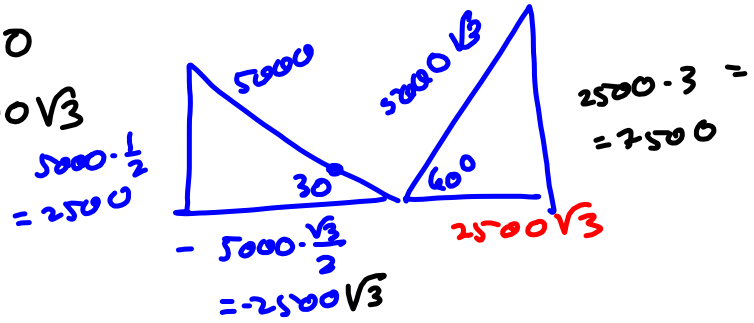
$= \frac{10000}{\frac{1}{2\sqrt{3}} + \frac{\sqrt{3}}{2}} = \frac{10000}{\frac{1}{2\sqrt{3}} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{\sqrt{3}}} = \frac{10000}{\frac{1+3}{2\sqrt{3}}}$

$= \frac{10000}{\left(\frac{4}{2\sqrt{3}}\right)} = 10000\left(\frac{\sqrt{3}}{2}\right) = 5000\sqrt{3} = d$

$\frac{4}{1} = \frac{2}{\frac{1}{4}} \qquad \frac{1}{4} \cdot \frac{1}{2} = \frac{1}{8}$

$\|\bar{u}\| = 5000$

$\|\bar{v}\| = 5000\sqrt{3}$



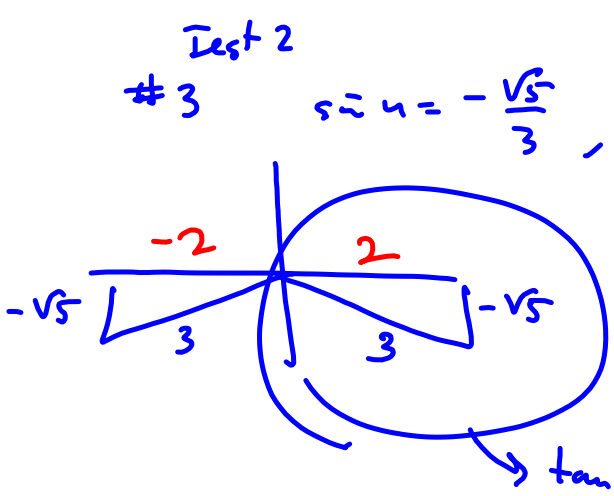
$\bar{u} + \bar{v} = \langle -2500\sqrt{3}, 2500 \rangle + \langle 2500\sqrt{3}, 7500 \rangle$

$= \langle 0, 10000 \rangle$

Test 2

#3 $\sin u = -\frac{\sqrt{5}}{3}$, $\tan u < 0$

$\sqrt{3^2 - \sqrt{5}^2} = \sqrt{4} = 2$

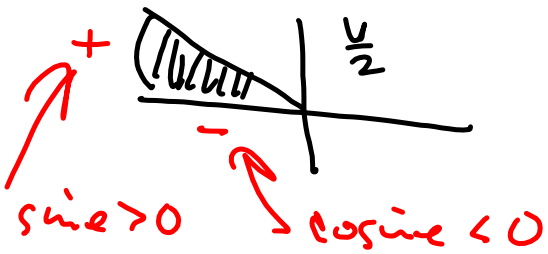


$\tan u < 0$

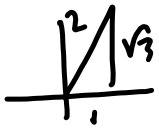
$270^\circ < u < 360^\circ$

$135^\circ < \frac{u}{2} < 180^\circ$

$\pm \sqrt{}$



6a $\cos\left(\frac{7\pi}{12}\right) = \cos\left(\frac{\pi}{3}+\frac{\pi}{4}\right) = \cos\frac{\pi}{3}\cos\frac{\pi}{4} - \sin\frac{\pi}{3}\sin\frac{\pi}{4}$



$\frac{7\pi}{12} = \frac{6\pi}{12}+\frac{\pi}{12} = \frac{5\pi}{12}+\frac{2\pi}{12} = \frac{4\pi}{12}+\frac{3\pi}{12}$

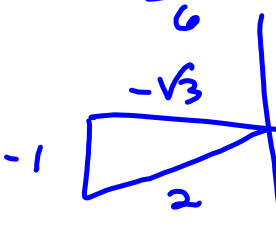
$= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) - \frac{\sqrt{3}}{2}\left(\frac{1}{\sqrt{2}}\right) = \boxed{\frac{1-\sqrt{3}}{2\sqrt{2}}}$

$= \boxed{\frac{\sqrt{2}-\sqrt{6}}{4}}$

6b $\cos\frac{7\pi}{12} = \cos\left(\frac{u}{2}\right)$

$\frac{u}{2} = \frac{7\pi}{12} \rightarrow u = \frac{2\cdot 7\pi}{12} = \frac{7\pi}{6}$

$\frac{7\pi}{6}$

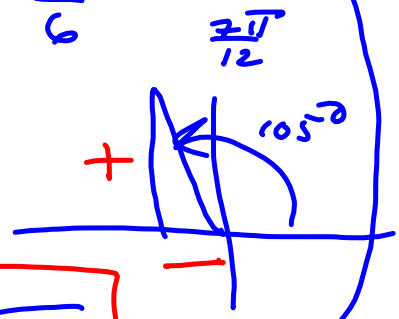


$\cos\frac{7\pi}{12} = -\sqrt{\frac{1+\cos\frac{7\pi}{6}}{2}}$

$= -\sqrt{\frac{1+\left(-\frac{\sqrt{3}}{2}\right)}{2}}$

$= -$

$\frac{7\pi}{12}$



$= \boxed{-\frac{\sqrt{2-\sqrt{3}}}{2}}$

$\sqrt{\frac{1-\frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{1}{1}\cdot\frac{2}{2}-\frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2-\sqrt{3}}{2}}{2}} = \sqrt{\frac{2-\sqrt{3}}{4}}$

$= \frac{\sqrt{2-\sqrt{3}}}{2}$