# Final Exam

1) $\sec \alpha = -\frac{11}{4}$

sec is negative in QII and QIII (S and T)

$\frac{\pi}{2} < \alpha < \frac{3\pi}{2}$

$\sec^{-1}\left(-\frac{11}{4}\right) \approx 1.94296$

$\csc\left(\sec^{-1}\left(-\frac{11}{4}\right)\right) = -\frac{11\sqrt{105}}{105}$    ← since we don't want to round, we
can put the previous whole expression.

In QII, csc is positive : $\frac{11\sqrt{105}}{105}$

In QIII, csc is negative : $-\frac{11\sqrt{105}}{105}$

∴ The two possible values for $\alpha$ are

$\frac{11\sqrt{105}}{105}$ and $-\frac{11\sqrt{105}}{105}$

2) $4^{2\cos x} - 2\left(4^{\cos x}\right) - 8 = 0$        $0 \leq x \leq \pi$

3) $|2z-1| = |z-2|$

$|2(a+bi)-1| = |(a+bi)-2|$

$|2a+bi-1| = |a+bi-2|$

$|(2a-1)+bi| = |(a-2)+bi|$

$\sqrt{(2a-1)^2+(bi)^2} = \sqrt{(a-2)^2+(bi)^2}$

$\sqrt{4a^2-4a+1-b} = \sqrt{a^2-4a+4-b}$

$4a^2-4a+1-b = a^2-4a+4-b$

$4a^2-4a+1 = a^2-4a+4$

$3a^2 = 3$

$a^2 = 1$

4) ~~20-4=16~~
~~16÷20=4/5~~
~~16~~

4) $20-4=16L$

$16÷20 = \frac{4}{5}$ of the current mixture is wine

$5 \cdot \frac{4}{5} = 4L$ out of the full $5L$ that was removed was wine

$16-4 = 12L$

$12÷20 = \frac{3}{5}$ of the remaining mixture was pure wine

If $\frac{3}{5}$ of the mixture is wine, then the other $\frac{2}{5}$ is water.

$\therefore \frac{2}{5}$ of the final mixture was water

5)
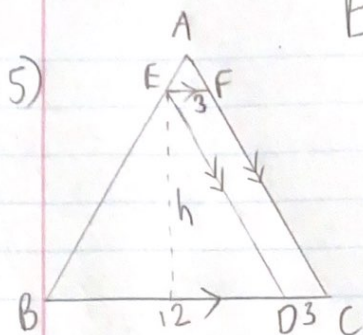
$\overline{EF} = \overline{DC} = 3$

$\triangle ABC \sim \triangle EBD$

$5 : 4$

$\triangle EBD = 12 \cdot \frac{h}{2}$

$\quad = 6h$

$\triangle ABC = \left(\frac{5}{4}\right)^2 \cdot 6h$

$\quad = \frac{75h}{8}$

▱$EFCD = 3 \cdot h$

$\quad = 3h$

▱$EFCD : \triangle ABC$

$3h : \frac{75h}{8}$

$3 : \frac{75}{8}$

$1 : \frac{25}{8}$

$8 : 25$

∴ The ratio of the area of parallelogram EFCD to the area of triangle ABC is 8:25