

You will have at least 20 minutes to complete the quiz. You may use a calculator, but show your work.

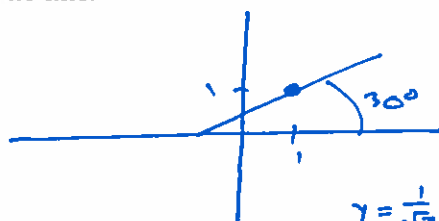
1. [5 pts] A 120 foot long rope is pulled taught from a 100 foot flagpole to the ground. What angle does the rope make with the flagpole?



$$\cos(\theta) = \frac{100}{120} = \frac{10}{12}$$

$$\theta = \arccos\left(\frac{10}{12}\right) \approx 33.56^\circ$$

2. [5 pts] Suppose a line makes a 30° angle with the positive x -axis and goes through the point $(1, 1)$. Find the equation of the line.



$$\tan(30^\circ) = \frac{m}{1} = m$$

$$m = \frac{1}{\sqrt{3}}$$

$$y = \frac{1}{\sqrt{3}}x + b$$

$$1 = \frac{1}{\sqrt{3}} + b \Rightarrow b = 1 - \frac{1}{\sqrt{3}}$$

$$\begin{cases} y = \frac{1}{\sqrt{3}}x + \left(1 - \frac{1}{\sqrt{3}}\right) \\ y = .577x + .423 \end{cases}$$

3. [5 pts] Find the (acute) angle that the line $y = 2x + 3$ makes with the horizontal.



$$\tan \theta = \frac{2}{1} = 2$$

$$\theta = \arctan(2) = 63.43^\circ$$

4. [5 pts] Find the perimeter of the largest right triangle in the figure below.

$$\tan(\alpha) = \frac{5}{6}$$

$$\alpha = \arctan\left(\frac{5}{6}\right) \approx 39.81^\circ$$

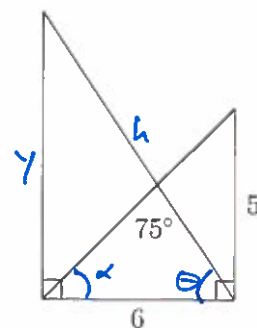
$$\Rightarrow \theta = 180 - 75 - 39.81 \approx 65.19^\circ$$

$$\tan(\theta) = \frac{y}{6}$$

$$y = 6 \cdot \tan(65.19) \approx 12.98$$

$$h^2 = y^2 + 6^2$$

$$h = \sqrt{y^2 + 6^2} = 14.30$$



$$\Rightarrow \text{Perimeter} = 6 + 12.98 + 14.30 = 33.28$$