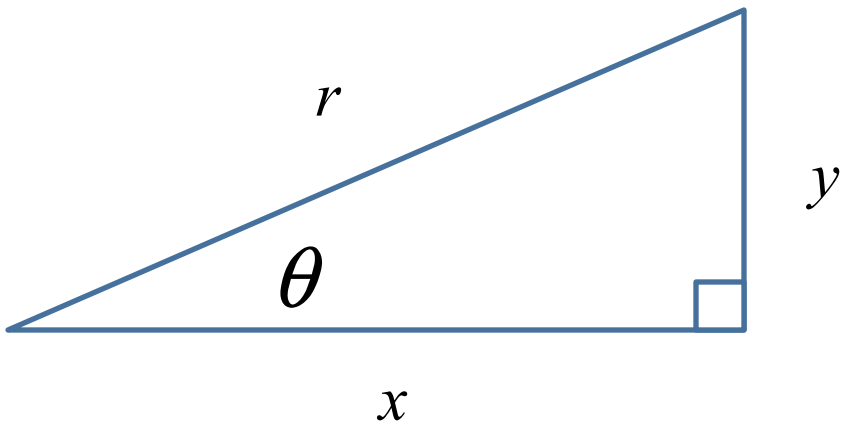
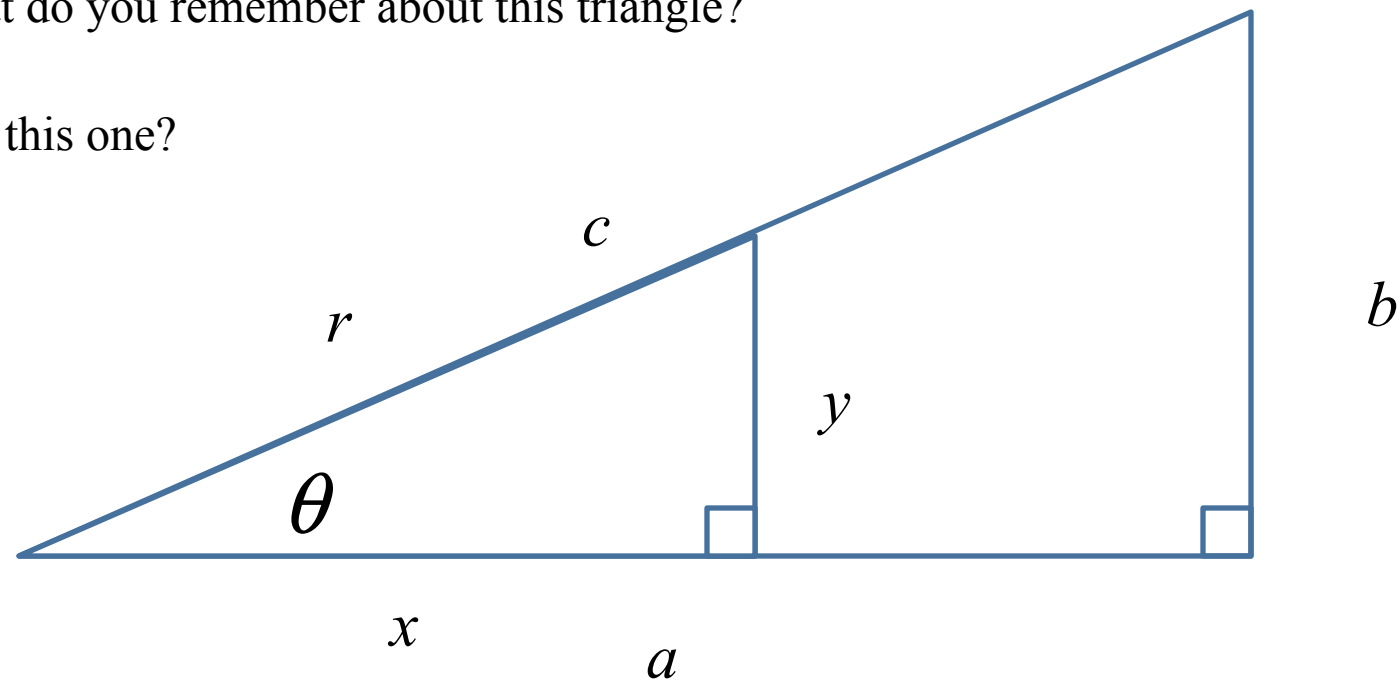


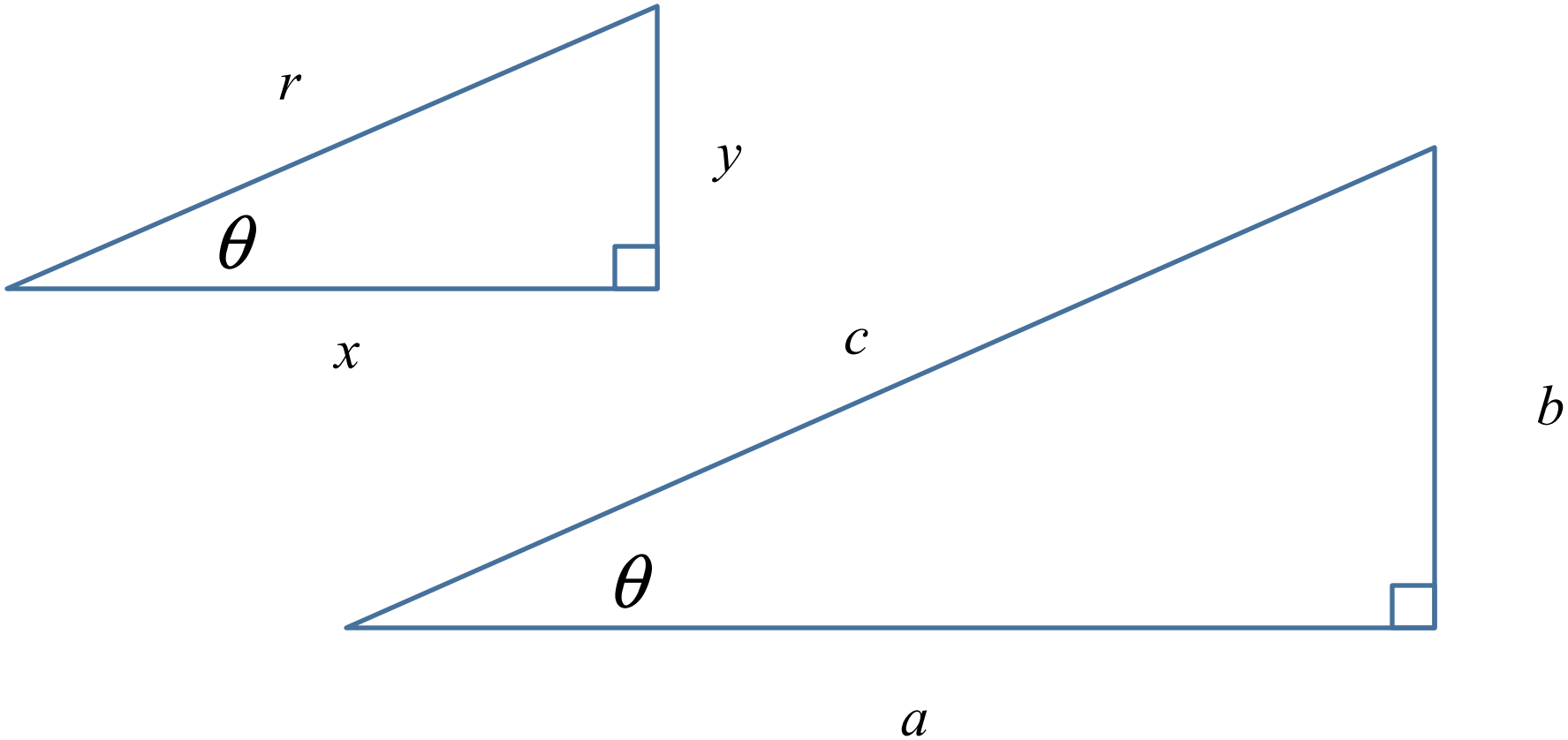
$$\frac{y}{r} \qquad \frac{x}{r} \qquad \frac{y}{x}$$

What do you remember about this triangle?

And this one?

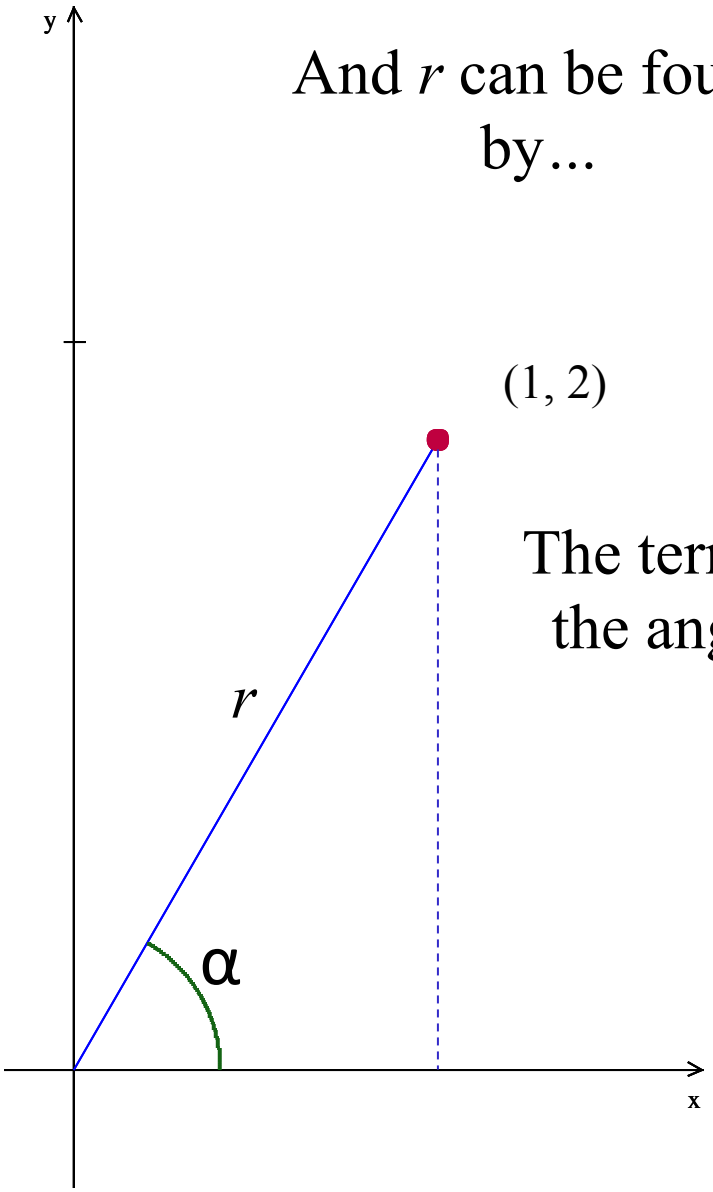


$$\frac{y}{r} = \frac{b}{c} \qquad \frac{x}{r} = \frac{a}{c} \qquad \frac{y}{x} = \frac{b}{a}$$



$$\frac{y}{r} \qquad \frac{x}{r} \qquad \frac{y}{x}$$

$$\frac{b}{c} \qquad \frac{a}{c} \qquad \frac{b}{a}$$



And r can be found by…

The terminal side of the angle here is r

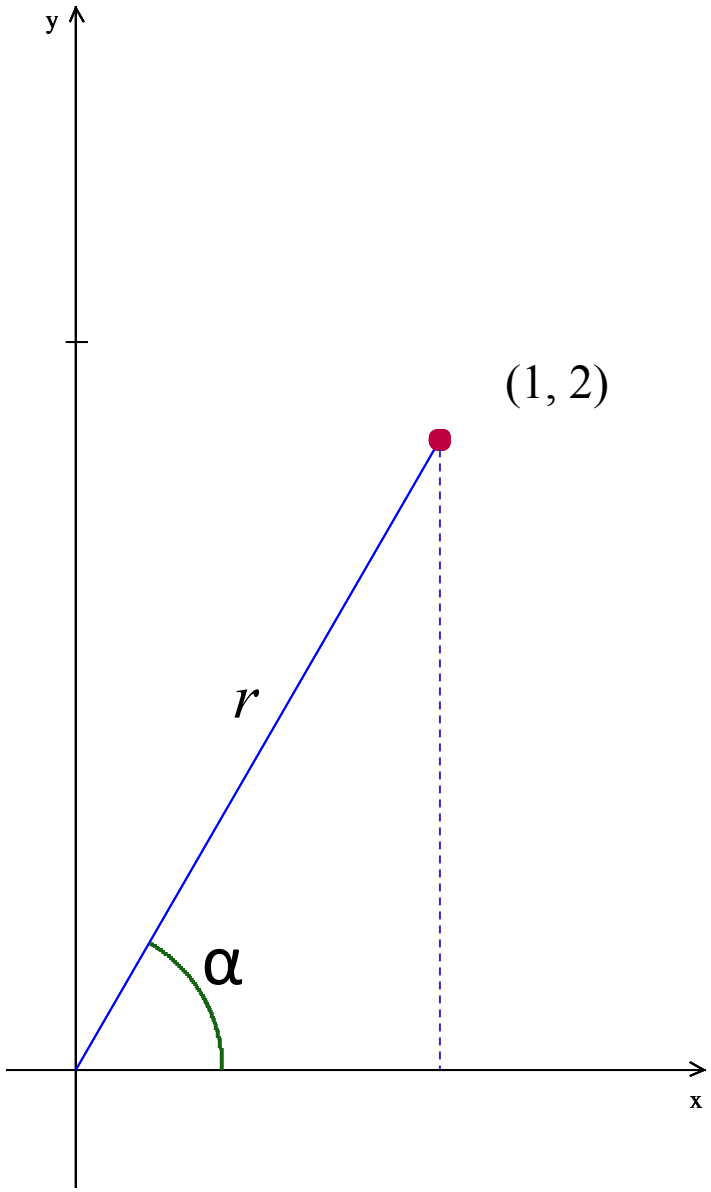
$$r^2 = x^2 + y^2$$

$$r^2 = 1^2 + 2^2$$

$$r = \sqrt{5}$$

$$\sin\alpha = ?$$

$$\sin\alpha = \frac{y}{r}$$



$$r = \sqrt{5}$$

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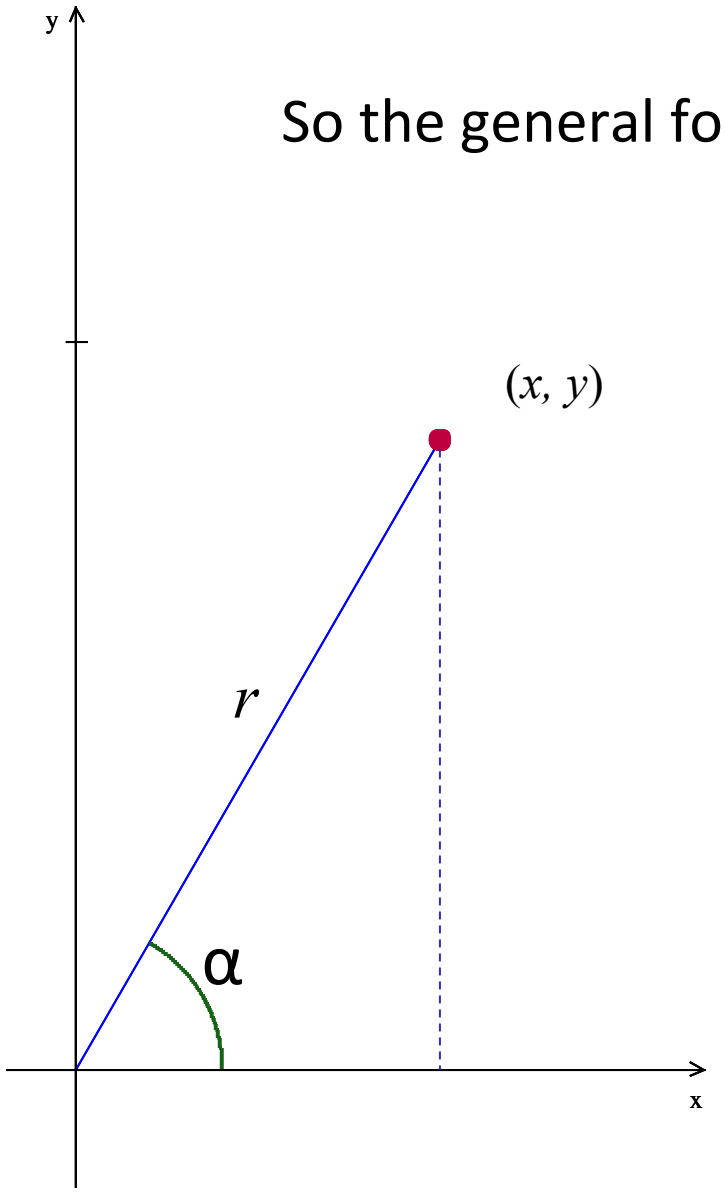
$$\sin\alpha = \frac{2}{\sqrt{5}} \qquad \csc\alpha = \frac{\sqrt{5}}{2}$$

$$\cos\alpha = \frac{1}{\sqrt{5}} \qquad \sec\alpha = \sqrt{5}$$

$$\tan\alpha = 2 \qquad \cot\alpha = \frac{1}{2}$$

So the general formulas look like this:



$$\sin\alpha = \frac{y}{r} \qquad \csc\alpha = \frac{r}{y}$$

$$\cos\alpha = \frac{x}{r} \qquad \sec\alpha = \frac{r}{x}$$

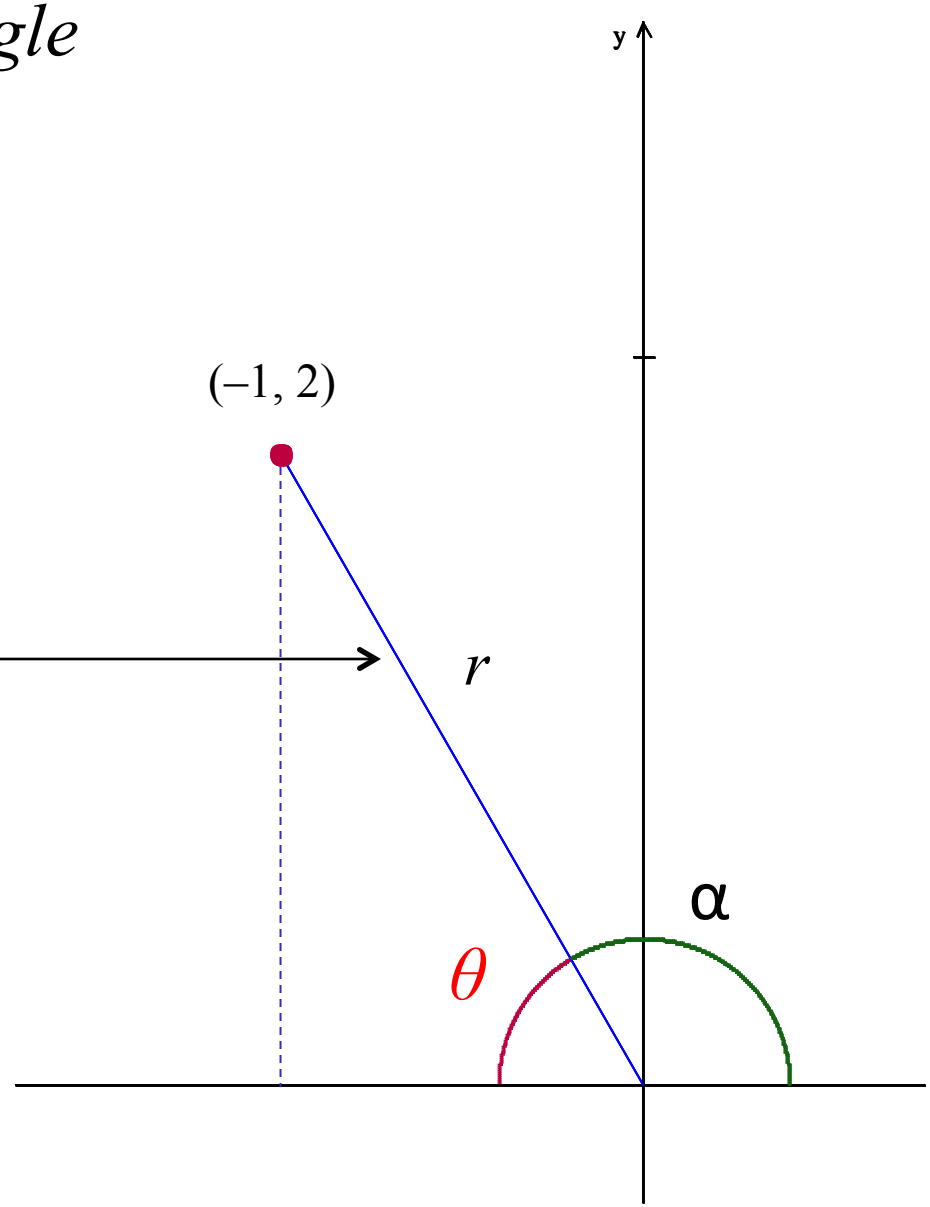
$$\tan\alpha = \frac{y}{x} \qquad \cot\alpha = \frac{x}{y}$$

θ is called the *reference angle*

reference angle

The acute angle made between the terminal side (r) and the x-axis

More on this later

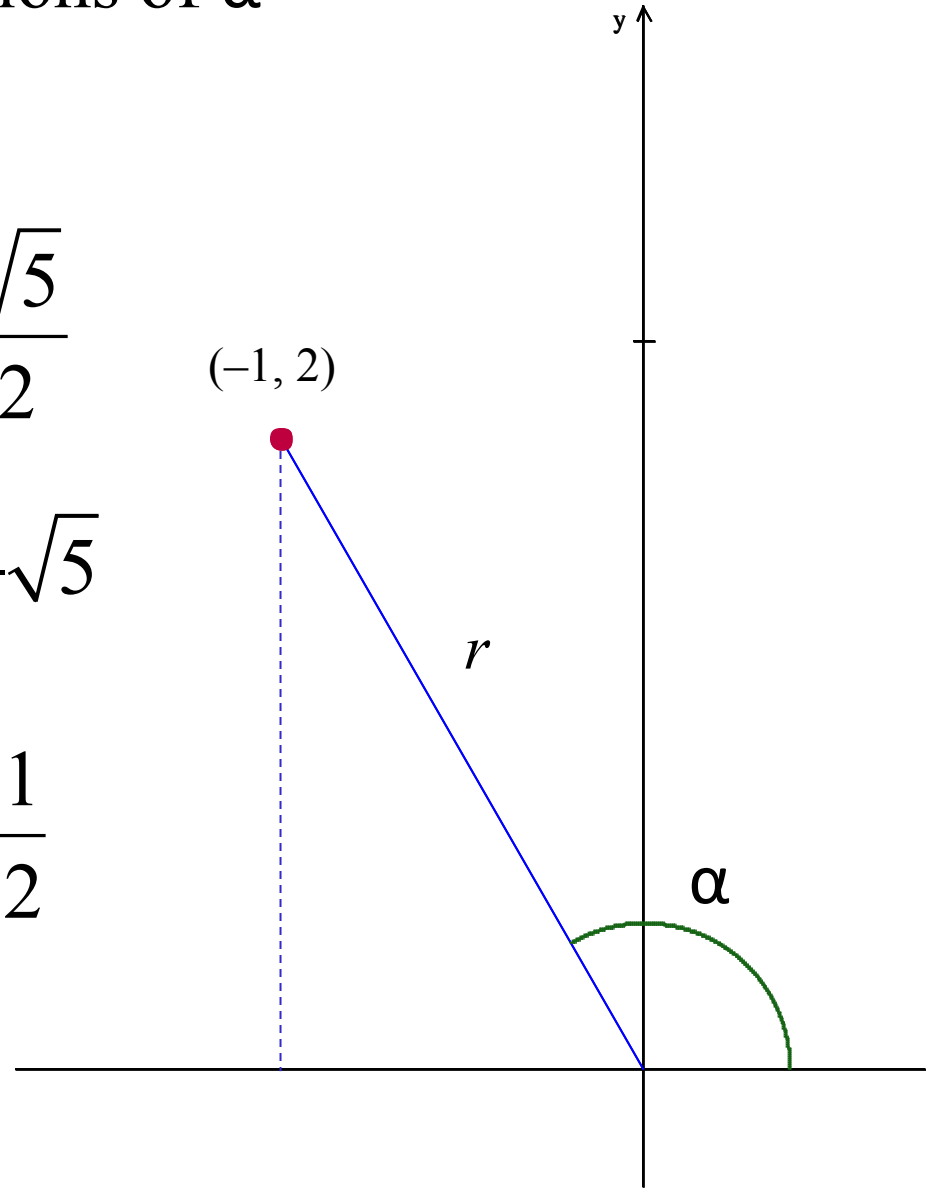


Find all of the trig functions of α

$$\sin\alpha = \frac{2}{\sqrt{5}} \qquad \csc\alpha = \frac{\sqrt{5}}{2}$$

$$\cos\alpha = -\frac{1}{\sqrt{5}} \qquad \sec\alpha = -\sqrt{5}$$

$$\tan\alpha = -2 \qquad \cot\alpha = -\frac{1}{2}$$



Find all of the trig functions of α given a terminal side through the point (–5, –12)

$$\sin\alpha = -\frac{12}{13} \qquad \csc\alpha = -\frac{13}{12}$$

$$\cos\alpha = -\frac{5}{13} \qquad \sec\alpha = -\frac{13}{5}$$

$$\tan\alpha = \frac{12}{5} \qquad \cot\alpha = \frac{5}{12}$$

Find all of the trig functions of θ given that

$$\sin\theta = -\frac{24}{25} \qquad \csc\theta = -\frac{25}{24}$$

$$\cos\theta = \frac{7}{25} \qquad \sec\theta = \frac{25}{7}$$

$$\tan\theta = -\frac{24}{7} \qquad \cot\theta = -\frac{7}{24}$$

…and θ is in Quadrant IV