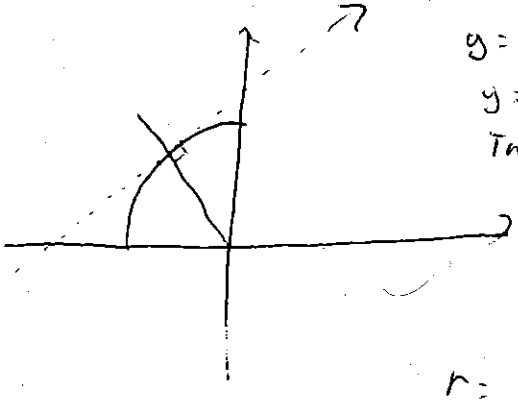
Math 124 KAUST Quiz 1 (20 minutes) January 11, 2017

Name: Key

Answer the questions in the spaces provided. Show all necessary work. If you have any questions, raise your hand and I will come try to answer.

1. The line $y = x + 5$ lies tangent to a circle centered at the origin of radius r. Find r.



$y = x + 5$ is orthogonal to $y = -x$, which is a radius. They intersect at the point ℓ is tangent to.

$-x = x + 5$

$x = -5/2$. Thus $y = -5/2$

$r = \sqrt{x^2 + y^2} = \sqrt{\frac{50}{4}} = \sqrt{\frac{25}{2}}$

2. Consider the following function:

$$f(x) = \frac{2x^2 + 5x + 3}{x^2 - 4x - 5}.$$

Compute the following if they exist. Otherwise say that the limit does not exists. Justify your answers. (HINT: factoring helps!)

$$\lim_{x \to -1} f(x) \tag{1}$$

$$\lim_{x \to 5} f(x). \tag{2}$$

$\frac{2x^2+5x+3}{x^2-4x-5} = \frac{(x+1)(2x+3)}{(x+1)(x-5)}$

$\lim_{x \to -1} \frac{(x+1)(2x+3)}{(x+1)(x-5)} = \lim_{x \to -1} \frac{2x+3}{x-5} = \frac{-1}{6}$

near $x = 5$

f looks like $\frac{2x+3}{x-5}$ which has a vertical asymptote @ 5

so $\lim_{x \to 5} f$ DNE