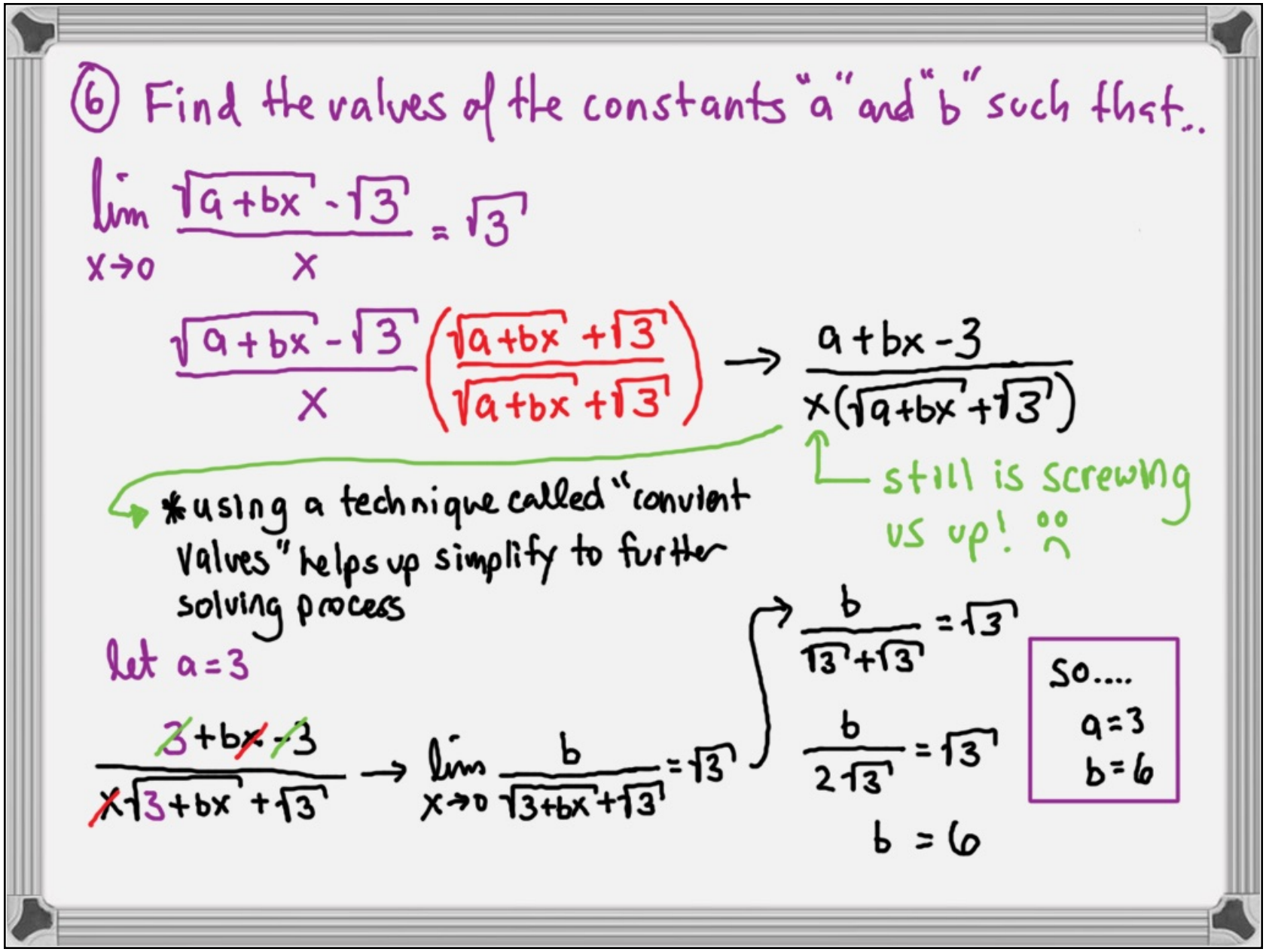
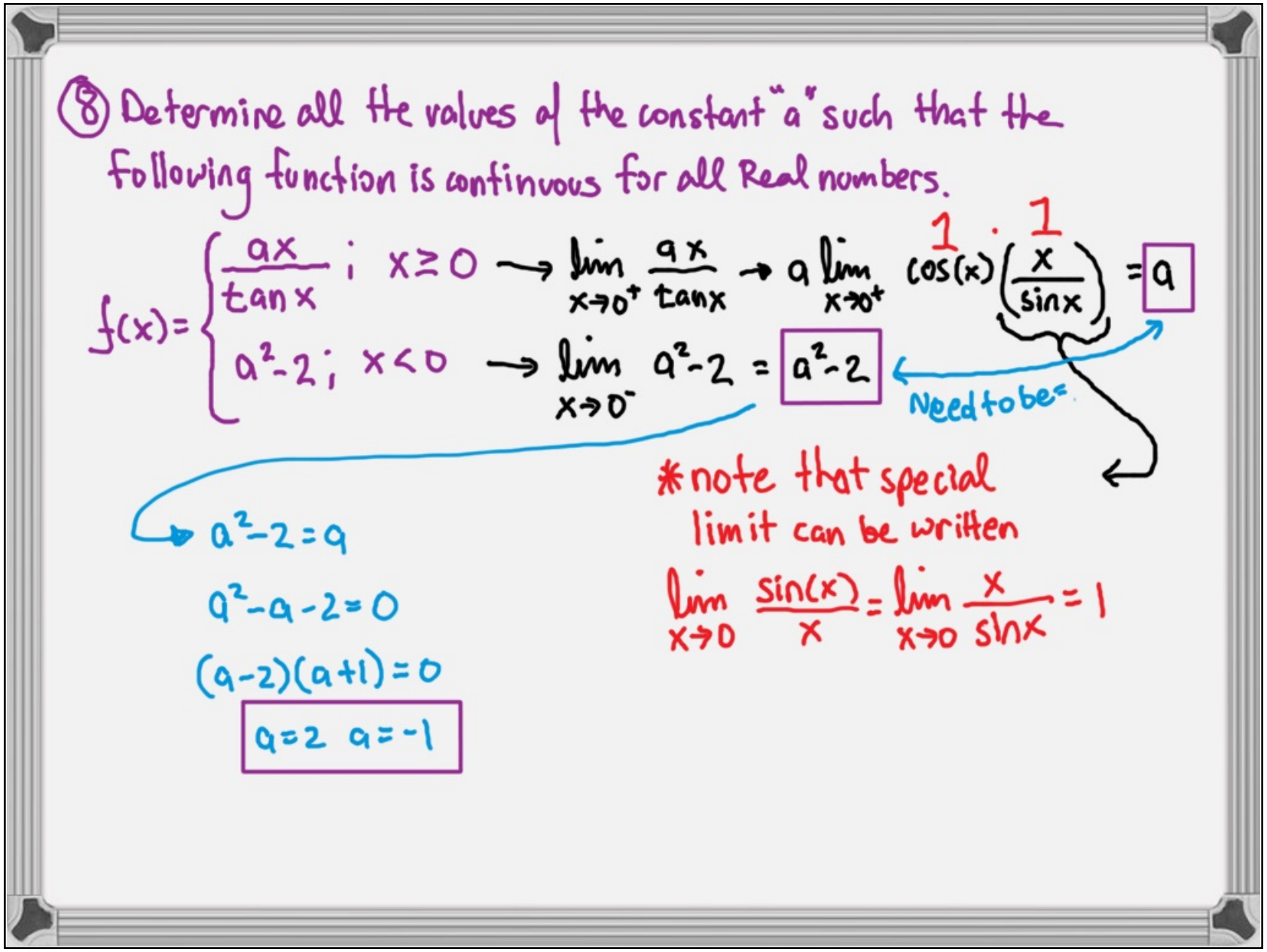
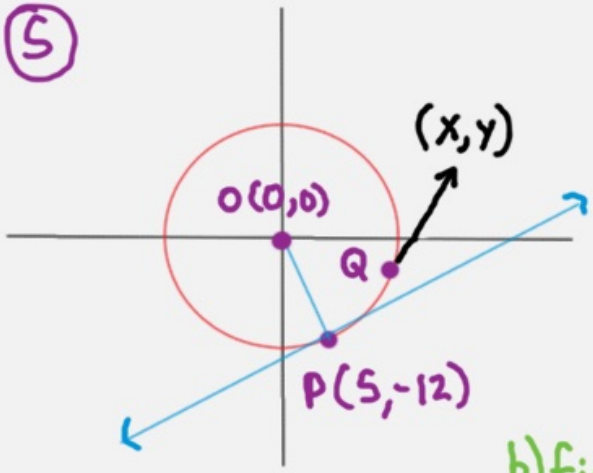

⑥ Find the values of the constants "a" and "b" such that..
$\lim_{x\to 0} \frac{\sqrt{a+bx}-\sqrt{3}}{x} = \sqrt{3}$
$\frac{\sqrt{a+bx}-\sqrt{3}}{x}\left(\frac{\sqrt{a+bx}+\sqrt{3}}{\sqrt{a+bx}+\sqrt{3}}\right) \rightarrow \frac{a+bx-3}{x(\sqrt{a+bx}+\sqrt{3})}$
still is screwing us up!
*using a technique called "convient values" helps up simplify to further solving process
let a=3
$\frac{3+bx-3}{x\sqrt{3+bx}+\sqrt{3}} \rightarrow \lim_{x\to 0} \frac{b}{\sqrt{3+bx}+\sqrt{3}} = \sqrt{3}$
$\frac{b}{\sqrt{3}+\sqrt{3}} = \sqrt{3}$
$\frac{b}{2\sqrt{3}} = \sqrt{3}$
b = 6
So....
a=3
b=6


(8) Determine all the values of the constant "a" such that the following function is continuous for all Real numbers.
f(x) = ax/tanx ; x ≥ 0 → lim x→0+ ax/tanx → a lim x→0+ cos(x) · 1/(x/sinx) = a
a²-2 ; x < 0 → lim x→0- a²-2 = a²-2
Need to be =
*note that special limit can be written
lim x→0 sin(x)/x = lim x→0 x/sinx = 1
a²-2 = a
a²-a-2 = 0
(a-2)(a+1) = 0
a = 2 a = -1

(5)



let $P(5,-12)$ be a point on the circle $x^2+y^2=169$

a) what is the slope of the tangent line joining O and P?

$$m = -\frac{12}{5}$$

b) Find the equation of the tangent line to the circle

$$(y+12) = \frac{5}{12}(x-5)$$

c) Let $Q(x,y)$ be another point in the fourth quad. Find the slope, m_x of the line joining P and Q in terms of x.

$$m = \frac{y-(-12)}{x-5} = \frac{y+12}{x-5}$$

$x^2+y^2=169$

$y = \pm\sqrt{169-x^2}$ → only need bottom half b/c Q is in 4th quad.

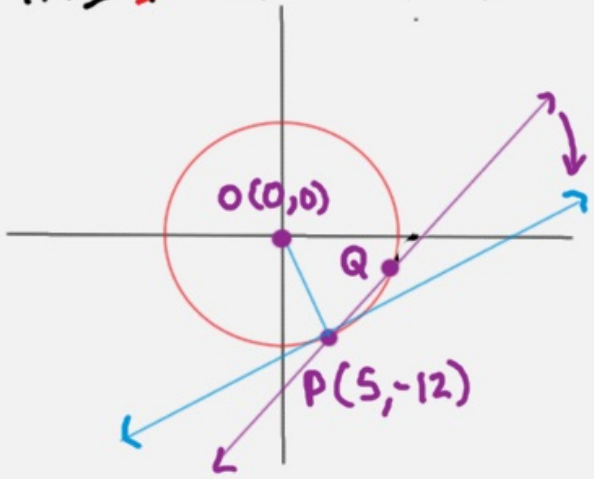
$$m = \frac{-\sqrt{169-x^2}+12}{x-5}$$

d) Calculate $\lim_{x \to 5} m_x$ How does this number relate to your answer in part (b)?

$$\lim_{x \to 5} \frac{12 - \sqrt{169 - x^2}}{x - 5} \left(\frac{12 + \sqrt{169 - x^2}}{12 + \sqrt{169 - x^2}} \right) = \frac{144 - (169 - x^2)}{(x-5)(12 + \sqrt{169 - x^2})}$$

$x^2 - 25 \rightarrow (x-5)(x+5)$

$$\lim_{x \to 5} \frac{(x-5)(x+5)}{(x-5)(12 + \sqrt{169 - x^2})} = \frac{5+5}{12 + \sqrt{169-25}} = \frac{10}{24} = \frac{5}{12}$$



as "x" approaches 5, the slope of the secant line approaches the slope of tangent line.