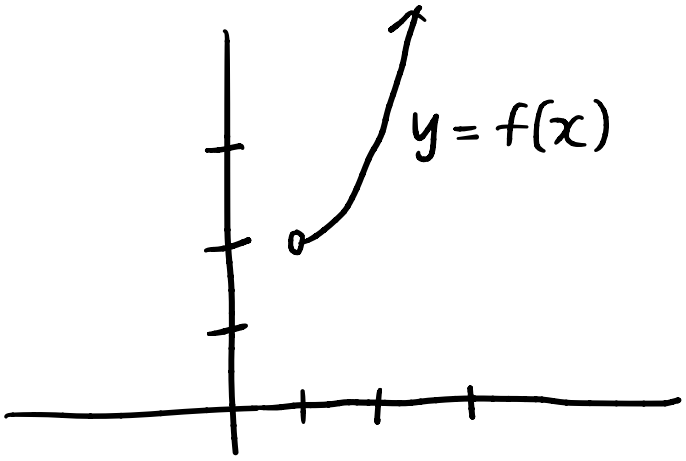
For what values of a and b is the following function

(1) Continuous

(2) Differentiable

$$f(x) = \begin{cases} x^2 + 1 & \text{if } x > 1 \\ ax + b & \text{if } x \leq 1 \end{cases}$$



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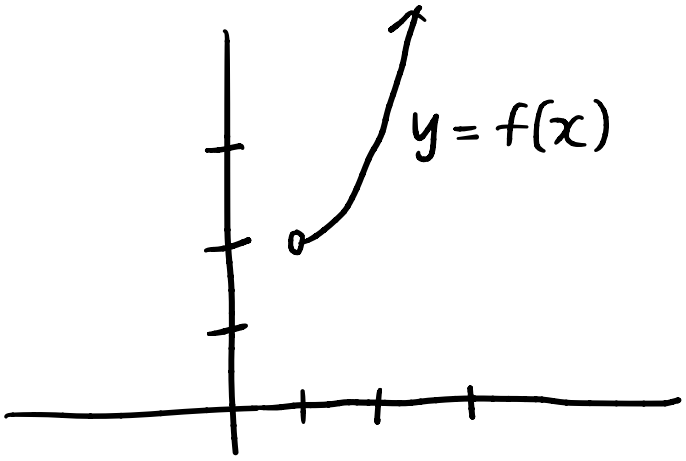

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Continuous: $x^2+1 = ax+b$ at $x=1$,

$1^2+1 = a(1)+b$

$\Rightarrow a+b=2$

Differentiable: $\lim_{x\to 1^-} f_1'(x) = \lim_{x\to 1^+} f_2'(x)$

$a = 2(1) = 2$

$\therefore 2+b=2 \Rightarrow b=0,\ a=2.$