Like prob 12. Find a & b that make f continuous.

$$f(x)=\begin{cases}\dfrac{x^2-4}{x-2} & \text{if } x<2\\ ax^2-bx & \text{if } 2\le x<3\\ 2x-a+b & \text{if } x\ge 3\end{cases}$$

f is automatically continuous at $x\neq 2$ and at $x\neq 3$.

f is continuous at $x=2$ if $\lim_{x\to 2} f(x) = f(2)$.

compute $\lim_{x\to 2^-} f(x) = \lim_{x\to 2^-} \dfrac{x^2-4}{x-2} = 4$ (see other board)

$\lim_{x\to 2^+} f(x) = \lim_{x\to 2^+} ax^2-bx = 4a-2b$

$f(2) = 4a-2b$

$4a-2b=4$

$2a-b=2$

$b=2a-2$, $5a-2(2a-2)=3$

$5a-4a+4=3$

$a=-1$, $b=-4$

at $x=3$ is continuous.

$\lim_{x\to 3^-} f(x) = \lim_{x\to 3^-} ax^2-bx = 9a-3b$

$\lim_{x\to 3^+} f(x) = \lim_{x\to 3^+} 2x-a+b = 6-a+b$

$f(3) = 6-a+b$

$4=4a-2b$

$6-a+b=9a-3b$

$10a-4b=6$

$5a-2b=3$