3. (6 points) Write the **limit definition** for the derivative of $\log(x^2+2)$ with respect to x. (There is no need to simplify or to attempt to find the limit.)

   If $f(x) = \log(x^2+2)$, then $f'(x) = \lim_{h\to 0} \dfrac{f(x+h)-f(x)}{h}$

   So in this case the derivative is,

   - $\lim_{h\to 0} \dfrac{\log((x+h)^2+2) - \log(x^2+2)}{h}$

4. (9 points) Consider the function $y = j(x)$ graphed below.

   Fill in the blanks with all the labelled x values (if any) on the graph satisfying each of the specified conditions. If there are no values which satisfy the condition, write "none."

   - The function j is discontinuous here: $g,\ h$
   - The function j is not differentiable here: $b,\ d,\ g,\ h$
   - The function j' is zero here: none
   - The function j' is negative here: e
   - The function j'' is positive here: a