**Math 1210** **Name:** _____

**Worksheet 3** **July 17, 2020**

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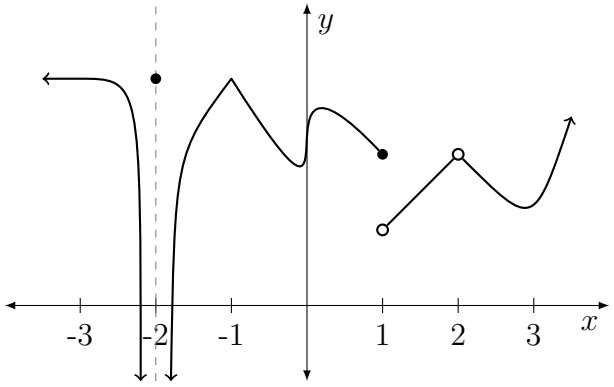
**Ex 1.** Recall that the *root* of a function is some value $x$ such that $f(x) = 0$. Now suppose that $f(x)$ is a continuous function that is defined everywhere. We also know that $f(1) = -5$, $f(2) = 8$, $f(3) = 2$, and $f(4) = -7$. Using only this information, which of the following intervals *must* contain a root of $f(x)$? (Circle all that apply.)

a) $[1, 2]$ b) $[2, 3]$ c) [3,4] d) None of the above

**Ex 2.** Show that for the function $p(x) = x^3 + 21x^2 - 2x - 42$, there exists a root somewhere in the interval $[0, 2]$. What about the intervals $[0, 1]$ or $[1, 2]$?

**Ex 3.** Consider the function $f(x)$ whose graph is given by




a) For what values $x$ is the function not defined?

b) For what values $x$ is the function not continuous?

c) For what values $x$ is the function not differentiable?

**Ex 4.** Using the limit definition of the derivative, calculate the derivative of the function $f(x) = 5x^2 + x$. Use this information to find the line tangent to $f(x)$ at $x = 1$.