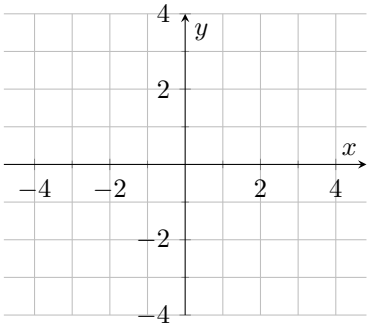
WORKSHEET: SECTION 2-5 (CONTINUITY)

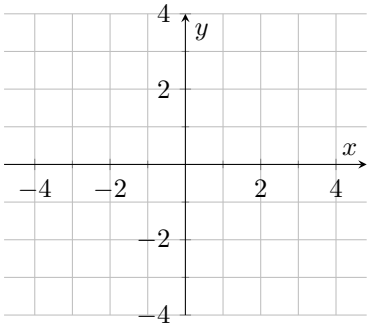
1. Sketch the graphs of three functions with
   (a) a removable discontinuity at $x = 2$,
   (b) a jump discontinuity at $x = -2$,
   (c) an infinity discontinuity at $x = 3$

   and that are continuous for all other real numbers:

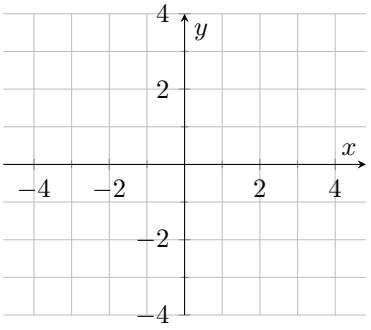
   (a) removable discontinuity



   (b) jump discontinuity



   (c) infinity discontinuity



2. Determine where the function $h(x) = \begin{cases} \sin x & x < \pi \\ 0 & x = \pi \\ x + 1 - \pi & x > \pi \end{cases}$ is not continuous and **justify** your answer. Sketch the graph of the function.

3. Use continuity to evaluate the limit $\lim_{x \to 10} \dfrac{x^2}{\sqrt{x-5}}$.

4. Determine the value of c that will make $f(x) = \begin{cases} c - x^2 & x \leq 1 \\ 5x - 2 & x > 1 \end{cases}$ continuous everywhere.

5. Use the Intermediate Value Theorem to show that there is a root of the equation $5+2x-x^4 = 0$ in the interval $(1, 2)$. To do so, explain how you are verifying that the hypotheses of the IVT hold, and then explaining what the IVT lets you conclude.