

For each problem, set up appropriate axes and draw the graph of a function satisfying all of the given conditions. Draw at least two separate examples for each problem (with each example on its own set of axes).

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1.  $\lim_{x \rightarrow 0^-} f(x) = 1$ , and  $\lim_{x \rightarrow 0^+} f(x) = 3$ , and  $f$  is continuous on  $(-\infty, 0)$  and  $(0, \infty)$ .
2.  $f(1) = 4$  and  $f$  has a removable discontinuity at 1 (but is continuous everywhere else).
3.  $f(1) = 4$  and  $f$  has a *non-removable* discontinuity at 1 (but is continuous everywhere else).
4.  $f(0) < 0$ , and  $f(3) > 0$ , and  $f$  is continuous on the closed interval  $[0, 3]$ .
5.  $f(0) < 0$ , and  $f(3) > 0$ , but there is *no* value of  $x$  at which  $f(x) = 0$ .