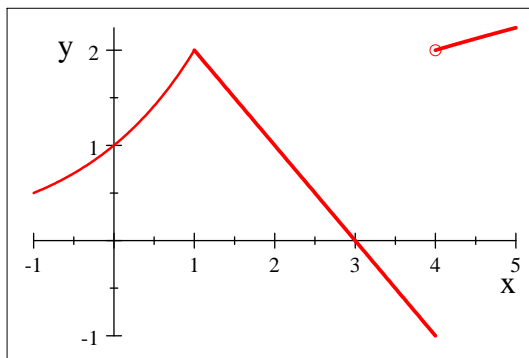


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$$42. \quad f(x) = \begin{cases} 2^x & \text{if } x \leq 1 \\ 3 - x & \text{if } 1 < x \leq 4 \\ \sqrt{x} & \text{if } x > 4 \end{cases},$$

$f$  is not continuous at  $x = 4$

$f$  is continuous from the left at  $x = 4$



54.  $\ln(x) = x - \sqrt{x}$ . Let  $f(x) = \ln(x) - x + \sqrt{x}$ .

Since  $f(\frac{1}{2}) = \ln(2) - \frac{1}{2} + \sqrt{\frac{1}{2}} = 0.900253962 > 0$  and

$f(e) = \ln(e) - e + \sqrt{e} = -6.95605578 \times 10^{-2} < 0$

there must be a  $x$  in  $(\frac{1}{2}, e)$  such that  $f(x) = 0$  by the Intermediate Value Theorem.

Or  $f(2) = 0.107360743 > 0$  and  $f(3) = -0.169336904 < 0$

there must be a  $x$  in  $(2, 3)$  such that  $f(x) = 0$  by the Intermediate Value Theorem.