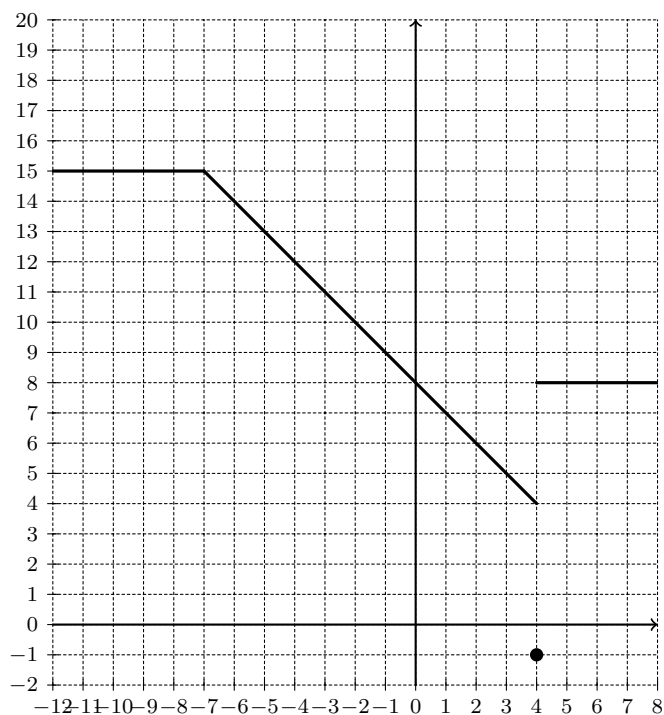


Example 6.7 Let $f(x) = \begin{cases} 15 & \text{if } x < -7 \\ 8 - x & \text{if } -7 \leq x < 4 \\ -1 & \text{if } x = 4 \\ 8 & \text{if } x > 4 \end{cases}$.

Sketch a graph of $f(x)$.



Evaluate the limits:

- (a) $\lim_{x \rightarrow -7^-} f(x) = 15$
- (b) $\lim_{x \rightarrow -7^+} f(x) = 15$
- (c) $\lim_{x \rightarrow -7} f(x) = 15$
- (d) $\lim_{x \rightarrow 4^-} f(x) = 4$
- (e) $\lim_{x \rightarrow 4^+} f(x) = 8$
- (f) $\lim_{x \rightarrow 4} f(x)$ does not exist

Example 6.8 Evaluate the limits, if they exist:

- (a) $\lim_{x \rightarrow -1} \frac{x+1}{x^2-1} = -\frac{1}{2}$
- (b) $\lim_{x \rightarrow 5} \frac{x^2-5x+6}{x-5}$ does not exist
- (c) $\lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h} = 3x^2$
- (d) $\lim_{x \rightarrow 0^-} \left(\frac{1}{x} - \frac{1}{|x|} \right) = -\infty$
- (e) $\lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \frac{1}{|x|} \right) = 0$