

SOLUTION

Find the following limits:

1. $\lim_{x \rightarrow -2} (3x - 7)$

$$\lim_{x \rightarrow -2} (3x - 7) = 3(-2) - 7 = -13$$

2. $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$

Evaluate first and see that you get $\frac{0}{0}$, which is indeterminate, which means that we have to do some work and “cancel out the zeros”.

$$\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2} = \lim_{x \rightarrow 2} \frac{(x - 2)(x + 3)}{(x - 2)} = \lim_{x \rightarrow 2} (x + 3) = 2 + 3 = 5.$$

3. $\lim_{x \rightarrow 9} \frac{9 - x}{3 - \sqrt{x}}$

Evaluate first and see that you get $\frac{0}{0}$, which is indeterminate, which means that we have to do some work and “cancel out the zeros”. In this case, multiply and divide by the conjugate.

$$\lim_{x \rightarrow 9} \frac{9 - x}{3 - \sqrt{x}} = \lim_{x \rightarrow 9} \frac{(9 - x)(3 + \sqrt{x})}{(3 - \sqrt{x})(3 + \sqrt{x})} = \lim_{x \rightarrow 9} \frac{(9 - x)(3 + \sqrt{x})}{9 - x} = \lim_{x \rightarrow 9} (3 + \sqrt{x}) = 3 + 3 = 6.$$

4. $\lim_{x \rightarrow 3^-} \frac{1}{x - 3}$

Evaluate first and see that you get $1/0$. This means that the limit is $+\infty$ or $-\infty$. We need to see which one it is.

Since x approaches 3 from the left, $x < 3$. Therefore $x - 3 < 0$.

This means that, when x approaches 3 from the left, the denominator of $\frac{1}{x - 3}$ is negative, whereas the numerator is positive. Therefore, as x approaches 3 from the left, $\frac{1}{x - 3}$ is negative (because $\frac{+}{-} = -$).

Therefore, $\lim_{x \rightarrow 3^-} \frac{1}{x - 3} = -\infty$