

Precalculus Unit 4: Rational Functions
HW: Limits Three

Answers

1. When the degree of the numerator is larger than the degree of the denominator, and x gets very large, the value of the numerator starts to get much larger than the value of the denominator. This makes the value of the fraction very large. Since the value of the function gets larger and larger without bound, $\lim_{x \rightarrow \infty} f(x) = \infty$.
 2. When the degree of the denominator is larger than the degree of the numerator, and x gets very large, the value of the denominator starts to get much larger than the value of the numerator. This makes the value of the fraction get closer and closer to 0. Therefore, $\lim_{x \rightarrow \infty} f(x) = 0$.
 3. As x gets very large, only the leading terms (terms with the biggest exponents of x) in the numerator and the denominator are significant. Therefore, $\frac{3x^2}{x^2-5}$ starts to look more and more like just $\frac{3x^2}{x^2}$ which equals 3. Since the value of the function is getting closer and closer to 3, $\lim_{x \rightarrow \infty} f(x) = 3$.
4. (a) $\frac{1}{2}$ (b) -25 (c) 0 (d) 0 (e) ∞ (f) -1 (g) -3 (h) ∞
5. (a) • The degree of the top: 3 • The leading coefficient of the top 24
• The degree of the bottom: 3 • The leading coefficient of the bottom. 48
- (b) $\frac{24}{48} = \frac{1}{2}$
- (c) ∞
6. (a) 3 (b) no limit
- (c) ∞ (d) $(1 - 1)^2 + 3 = 3$
7. (a) $\frac{9}{6} + \frac{3}{6} = \frac{12}{6} = 2$ (b) $\frac{18}{24} + 0 = \frac{2}{3}$ (c) $0 + 0 + 7 = 7$