Math 2215 - Calculus 1

Homework #5 Solutions

Assigned - 2009.08.25

Due - 2009.08.31

Textbook problems:

Section 1.5 - 1, 4, 6, 10, 15, 17, 21, 24, 28, 30, 50, 69

Fun Problems:

Compute the following limits:

1.

$$\begin{aligned}\lim_{t\to\infty} t^3\sqrt{\frac{2t^2+5}{7t^8+5t^7+3t^2-1}} &= \lim_{t\to\infty}\sqrt{\frac{t^6(2t^2+5)}{7t^8+5t^7+3t^2-1}}\\ &= \lim_{t\to\infty}\sqrt{\frac{2t^8+5t^6)}{7t^8+5t^7+3t^2-1}}\\ &= \sqrt{\lim_{t\to\infty}\left(\frac{2t^8+5t^6)}{7t^8+5t^7+3t^2-1}\right)}\\ &= \sqrt{\frac{2}{7}}.\end{aligned}$$

2.

$$\begin{aligned}\lim_{x\to\infty}\frac{2x}{\sqrt[4]{x^4-1}} &= \lim_{x\to\infty}\frac{2\sqrt[4]{x^4}}{\sqrt[4]{x^4-1}}\\ &= \lim_{x\to\infty} 2\sqrt[4]{\frac{x^4}{x^4-1}}\\ &= 2\sqrt[4]{\lim_{x\to\infty}\frac{x^4}{x^4-1}}\\ &= 2\cdot 1\\ &= 2.\end{aligned}$$

3.

$$\begin{aligned}\lim_{x\to-\infty}\frac{2x}{\sqrt[4]{x^4-1}} &= \lim_{x\to-\infty}\frac{-2\sqrt[4]{x^4}}{\sqrt[4]{x^4-1}}\\ &= \lim_{x\to-\infty} -2\sqrt[4]{\frac{x^4}{x^4-1}}\\ &= -2\sqrt[4]{\lim_{x\to-\infty}\frac{x^4}{x^4-1}}\\ &= -2\cdot 1\\ &= -2.\end{aligned}$$

4.

$$\begin{aligned}\lim_{s\to 0^+} \tan^{-1}\left(\frac{1}{s}\right) &= \lim_{t\to\infty} \tan^{-1}(t) \\ &= \frac{\pi}{2}\end{aligned}$$

5.

$$\begin{aligned}\lim_{s\to 0^-} \tan^{-1}\left(\frac{1}{s}\right) &= \lim_{t\to-\infty} \tan^{-1}(t) \\ &= -\frac{\pi}{2}\end{aligned}$$