Section 2-6 Homework Help

#26

$$\lim_{x\to-\infty}\left(x+\sqrt{x^2+2x}\right)=\lim_{x\to-\infty}\frac{\left(x+\sqrt{x^2+2x}\right)}{1}\cdot\frac{x-\sqrt{x^2+2x}}{x-\sqrt{x^2+2x}}$$

$$=\lim_{x\to-\infty}\frac{x^2-\left(x^2+2x\right)}{x-\sqrt{x^2+2x}}$$

$$=\lim_{x\to-\infty}\frac{-2x}{x-\sqrt{x^2+2x}}$$

$$\sim\lim_{x\to-\infty}\frac{-2x}{x-\sqrt{x^2}}$$

$$=\lim_{x\to-\infty}\frac{-2x}{x-\sqrt{x^2}}$$

$$=\lim_{x\to-\infty}\frac{-2x}{x-|x|}$$

$$=\lim_{x\to-\infty}\frac{-2x}{x-(-x)}\ \left[\text{since } |x|=-x \text{ for } x<0\right]$$

$$=\lim_{x\to-\infty}\frac{-2x}{2x}$$

$$=-1$$

#36

$$\lim_{x\to\infty}\frac{\sin^2(x)}{x^2+1}\to\frac{\text{between 0 and 1}}{\text{goes to }\infty}\to 0$$

$$0\le\lim_{x\to\infty}\frac{\sin^2(x)}{x^2+1}\le\lim_{x\to\infty}\frac{1}{x^2+1}$$

$$0\le\lim_{x\to\infty}\frac{\sin^2(x)}{x^2+1}\le 0$$

$$\downarrow$$

$$\lim_{x\to\infty}\frac{\sin^2(x)}{x^2+1}=0$$