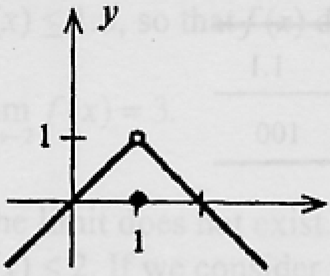
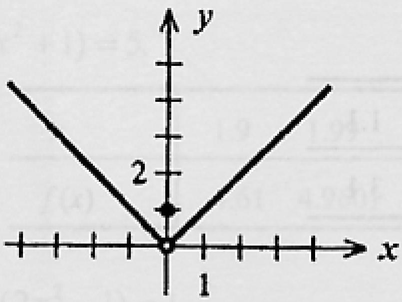
2.4 limits

19.



$$\lim_{x\to 1} f(x) = 1$$

21.



$$\lim_{x\to 0} f(x) = 0$$

39. $\lim_{x\to -1} \frac{\sqrt{x^2+8}}{2x+4} = \frac{\sqrt{(-1)^2+8}}{2(-1)+4} = \frac{\sqrt{9}}{2} = \frac{3}{2}.$

50. $\lim_{x\to -2} \frac{x^2-4}{x+2} = \lim_{x\to -2} \frac{(x-2)(x+2)}{x+2} = \lim_{x\to -2}(x-2) = -2-2 = -4.$

57. $\lim_{x\to -2} \frac{x^2-x-6}{x^2+x-2} = \lim_{x\to -2} \frac{(x-3)(x+2)}{(x+2)(x-1)} = \lim_{x\to -2} \frac{x-3}{x-1} = \frac{-2-3}{-2-1} = \frac{5}{3}.$

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$$\lim_{x\to 1} \frac{\sqrt{x}-1}{x-1} = \lim_{x\to 1} \frac{\sqrt{x}-1}{x-1} \cdot \frac{\sqrt{x}+1}{\sqrt{x}+1} = \lim_{x\to 1} \frac{x-1}{(x-1)(\sqrt{x}+1)} = \lim_{x\to 1} \frac{1}{\sqrt{x}+1} = \frac{1}{2}.$$

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$$\lim_{x\to 1} \frac{x-1}{x^3+x^2-2x} = \lim_{x\to 1} \frac{x-1}{x(x-1)(x+2)} = \lim_{x\to 1} \frac{1}{x(x+2)} = \frac{1}{3}.$$