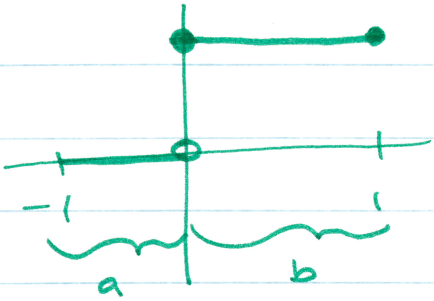
3.2

(37)



$[-\frac{1}{2}, \frac{1}{2}]$

$f'(-\frac{1}{2}) = 0$

$f'(\frac{1}{2}) = 1$

(31) $f(x) = \frac{x^3-8}{x^2-4x-5} =$

$x^2-4x-5=0$

$(x+1)(x-5)=0$

$x=-1, 5$

(39) (a) $3-(1) = a(1)^2 + b(1)$

$2-a=b$ $\boxed{2 = a+b}$

(b) $\lim_{h\to 0^-} \frac{[3-(1+h)]-[3-1]}{h}$ $\lim_{h\to 0^+} \frac{[a(1+h)^2+b(1+h)]-[a+b]}{h}$

$\lim_{h\to 0^-} \frac{[2-h]-[2]}{h}$ $\lim_{h\to 0^+} \frac{[a(1+2h+h^2)+b+bh]-[a+b]}{h}$

$\lim_{h\to 0^-} \frac{-h}{h} = -1$ $\lim_{h\to 0^+} \frac{[\cancel{a}+2ah+ah^2\cancel{+b}+bh]-[\cancel{a+b}]}{h}$

$\boxed{2a+b=-1}$ $\lim_{h\to 0^+} \frac{\cancel{h}(2a+ah+b)}{\cancel{h}} = 2a+b$

$2a+2-a=-1$

$a+2=-1$

$a=-3$ $b=5$

$f(1+h) \quad f(h)$

3.2 $\downarrow \quad \swarrow$

(2) $\lim\limits_{h \to 0^-} \frac{2-2}{h} = 0$

$\lim\limits_{h \to 0^+} \frac{2(1+h) - (2)}{h}$

$\lim\limits_{h \to 0^+} \frac{4-2}{h} = 2$

3.2

17 35

$$g(x) \begin{cases} (x+1)^2, & x \le 0 \\ 2x+1, & 0 < x < 3 \\ (4-x)^2, & x \ge 3 \end{cases}$$

37 $$f(x) = \begin{cases} 0, & -1 \le x < 0 \\ 1, & 0 \le x \le 1 \end{cases}$$

39 $$f(x) = \begin{cases} 3-x, & x < 1 \\ ax^2+bx, & x \ge 1 \end{cases} \qquad f'(x) = \begin{cases} -1 & , x < 1 \\ 2ax+b & , x \ge 1 \end{cases}$$

(a) $3-1 = a(1)^2 + b(1)$

$\underline{2 = a+b}$

$-b \qquad -b$

$\boxed{2-b=a}$

$2-5=a$

$-3=a$

(b) $-1 = 2a(1)+b$

$\underline{-1 = 2a+b}$

$-1 = 2(2-b)+b$

$-1 = 4-2b+b$

$-4 \quad -4$

$-5 = -b$

$5=b$

3.2

(3) $f(x) = \begin{cases} \sqrt{x} & , \; x \le 1 \\ 2x-1 & , \; x > 1 \end{cases}$

$$\lim_{h\to 0^-} \frac{\sqrt{1+h} - \sqrt{1}}{h} = \lim_{h\to 0^-} \frac{\sqrt{1+h} - 1}{h} \cdot \frac{\sqrt{1+h} + 1}{\sqrt{1+h} + 1}$$

$$\lim_{h\to 0^-} \frac{\cancel{1} + h - \cancel{1}}{h(\sqrt{1+h} + 1)} = \lim_{h\to 0^-} \frac{\cancel{h}}{\cancel{h}(\sqrt{1+h}+1)} = \lim_{h\to 0^-} \frac{1}{\sqrt{1+h}+1} \quad \frac{1}{2}$$

$$\lim_{h\to 0^+} \frac{[2(1+h) \overset{+}{-} 1] - \sqrt{1}}{h} = \lim_{h\to 0^+} \frac{\cancel{2} + 2h \overset{+}{\cancel{-1}} \cancel{-1}}{h} = \lim_{h\to 0^+} \frac{2\cancel{h}}{\cancel{h}}$$

$$= \lim_{h\to 0^+} 2 = 2$$