13 $f(x)=x^3+2x-4$, $f'(x)=3x^2+2$

$$\Rightarrow x_{n+1}=x_n-\frac{x_n^3+2x_n-4}{3x_n^2+2}=\frac{2x_n^3+4}{3x_n^2+2}$$

22.

Find a solution of the equation $\frac{1}{x^2+1}=x$

Let $f(x)=x-\frac{1}{x^2+1}$, $f'(x)\ 1+\frac{2x}{(x^2+1)^2}$

$$\Rightarrow x_{n+1}=x_n-\frac{x_n-\frac{1}{x_n^2+1}}{1+\frac{2x_n}{(x_n^2+1)^2}}=\frac{3x_n^2+1}{(x_n^2+1)^2+2x_n}$$

4.2-31.

a) $f'(x)=(x-1)(x+2)(x-3)$

$f'(x)=0 \Rightarrow x=1$ or $x=-2$ or $x=3$

$\Rightarrow x=1,-2,3$ are critical points of f

b)

$x<-2$	$-2<x<1$	$1<x<3$	$x>3$
$f'(x)<0$	$f'(x)>0$	$f'(x)<0$	$f'(x)>0$

$\Rightarrow \begin{cases} f \text{ is increasing on } (-2,1)\cup(3,\infty) \\ f \text{ is decreasing on } (-\infty,-2)\cup(1,3) \end{cases}$

c)

According to the same table in b)

$\Rightarrow f$ have local minimum at $x=-2,3$

& local maximum at $x=1$.

33

a) $f'(x)=x^{-\frac{1}{5}}(x+2)$

$f'(x)=0 \Rightarrow x=-2$, $f'(x)$ does not exist at $x=0$

$\Rightarrow x=-2,0$ are critical points of f

b)

$\begin{cases} f \text{ is increasing on } (-\infty,-2)\cup(0,\infty) \\ f \text{ is decreasing on } (-2,0) \end{cases} \Leftarrow$

$x<-2$	$-2<x<0$	$x>0$
$f'(x)>0$	$f'(x)<0$	$f'(x)>0$

c) See text book's solution

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57

$g(x) = x^2 - 4x + 4, \quad 1 \le x < \infty$

$\Rightarrow g'(x) = 2x - 4, \quad 1 \le x < \infty$

$g'(x) = 0 \Rightarrow x = 2$ (critical point) $\Rightarrow \begin{cases} g'(x) < 0, & x < 2 \\ g'(x) > 0, & x > 2 \end{cases}$

$\Rightarrow g(x)$ has local minimum $g(2) = 0$ at $x = 2$

endpoints $\Rightarrow g(1) = 1$ & $g'(x) < 0, \quad 1 \le x < 2$

$\Rightarrow g(x)$ has local maximum 1 at $x = 1$

61

$h(x) = \frac{x^3}{3} - 2x^2 + 4x, \quad 0 \le x < \infty$

$\Rightarrow h'(x) = x^2 - 4x + 4 = (x-2)^2, \quad 0 \le x < \infty$

$h'(x) = 0 \Rightarrow x = 2$ (critical point) $\Rightarrow h'(x) \ge 0, \quad x \ge 0$

$\Rightarrow h(x)$ has no extreme value in $(0, \infty)$

endpoint $\Rightarrow h(0) = 0$ & $h'(x) > 0, \quad x \ge 0$

$\Rightarrow h(x)$ has local minimum 0 at $x = 0$

63 $y = x^3 - 6x \quad , -2 \le x \le 2$

$\Rightarrow \frac{dy}{dx} = 3x^2 - 6 = 3(x^2-2) \quad , -2 \le x \le 2$

$\frac{dy}{dx} = 0 \Rightarrow x = \sqrt{2}, -\sqrt{2}$ (critical points)

$\Rightarrow$

$-2 < x < -\sqrt{2}$	$-\sqrt{2} < x < \sqrt{2}$	$\sqrt{2} < x < 2$
$\frac{dy}{dx} > 0$	$\frac{dy}{dx} < 0$	$\frac{dy}{dx} > 0$

$\Rightarrow y = x^3 - 6x$ has local maximum $4\sqrt{2}$ at $x = -\sqrt{2}$

& local minimum $-4\sqrt{2}$ at $x = \sqrt{2}$

endpoints: $y(-2) = 4$ & $\frac{dy}{dx} > 0 \quad , -2 < x < -\sqrt{2}$

$\Rightarrow y$ has local minimum 4 at $x = -2$

$y(2) = -4$ & $\frac{dy}{dx} > 0 \quad , \sqrt{2} < x < 2$

$\Rightarrow y$ has local maximum -4 at $x = 2$

81

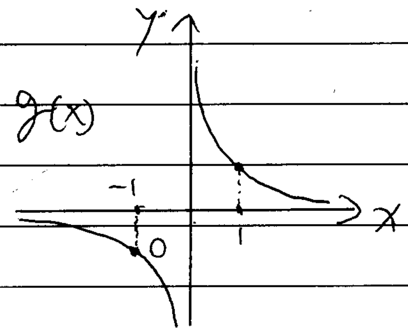
a) $g(x) = \frac{1}{x} \Rightarrow g'(x) = -\frac{1}{x^2} < 0 \quad , x \neq 0$

$\Rightarrow g$ is decreasing at $x \neq 0$

b)

g is decreasing on $(-\infty, 0) \cup (0, \infty)$

but g is not continuous at $x = 0$



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