Sec 4.2 page 268 (1, 3, 5-8, 13, 15-17, 23-26, 33, 41, 42, 44, 46)

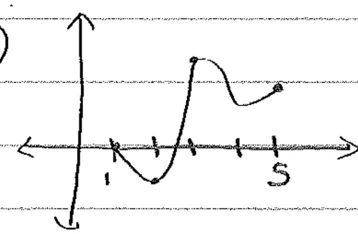
(1) absolute is the very smallest $f(x)$ value and can be at an end point over a domain.
Local is the lowest value when x is near c and cannot be an endpoint.

(3)
a neither
b local min
c local max
d neither
r. absolute and local min
s absolute max

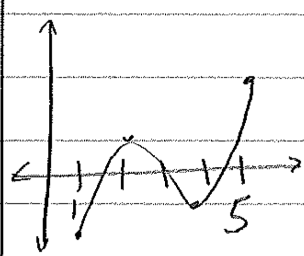
(5) absolute min - DNE
absolute max - $f(4) = 5$
local min - $f(2) = 2$, $f(5) = 3$
local max - $f(4) = 5$, $f(6) = 4$

(6) absolute min - $f(4) = 1$
absolute max - DNE
local min - $f(2) = 2$, $f(4) = 1$
local max - $f(3) = 4$, $f(6) = 3$

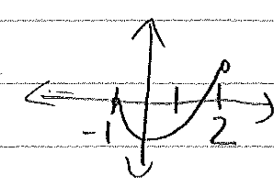
(7)



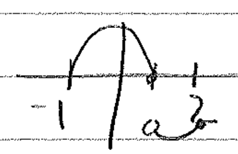
(8)



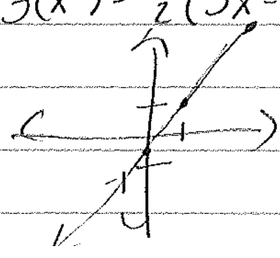
(13) a



b)

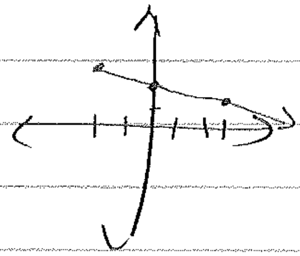


(15) $f(x) = \frac{1}{2}(3x-1) \quad x \leq 3$



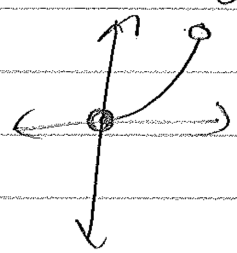
only an absolute max at $f(3) = 4$

(16) $f(x) = 2 - \frac{1}{3}x \quad x \geq -2$



only absolute max at $f(-2) = \frac{8}{3}$

(17) $f(x) = x^2 \quad 0 < x < 2$



no absolute or local max and mins.

(23) $f(x) = 4 + \frac{1}{3}x - \frac{1}{2}x^2 \qquad D: (-\infty, \infty)$

$f'(x) = \frac{1}{3} - x \qquad \boxed{C\# \text{ is } 1/3}$

(24) $f(x) = x^3 + 6x^2 - 15x \qquad D: (-\infty, \infty)$

$f'(x) = 3x^2 + 12x - 15 \qquad \boxed{\therefore C\# \text{ are } -5, 1}$

$f'(x) = 3(x + 4x - 5)$

$f'(x) = 3(x+5)(x-1)$

(25) $f(x) = x^3 + 3x^2 - 24x \qquad \boxed{\begin{array}{l} D: (-\infty, \infty) \\ \therefore C\# \text{ are } -4, 2 \end{array}}$

$f'(x) = 3x^2 + 6x - 24$

$f'(x) = 3(x^2 + 2x - 8)$

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

(26) $S(x) = x^3 + x^2 + x$

$S'(x) = 3x^2 + 2x + 1$

c# are $\frac{-2 \pm \sqrt{4-4(3)(1)}}{2(3)}$ ← neg ∴ $\boxed{\text{there are no crit \#'s.}}$

(33) $F(x) = x^{4/5}(x-4)^2$

$F'(x) = \frac{4}{5}x^{-1/5}(x-4)^2 + 2x^{4/5}(x-4)$

$F'(x) = (x-4)\left(\frac{4}{5}x^{-1/5}(x-4)) + 2x^{4/5}\right)$

$F'(x) = (x-4)\left(\frac{4}{5}x^{4/5} - \frac{16}{5}x^{-1/5} + 2x^{4/5}\right)$

$F'(x) = (x-4)\left(2\frac{4}{5}x^{4/5} - \frac{16}{5x^{1/5}}\right)$

$F'(x) = (x-4)\left(\frac{14x-16}{5x^{1/5}}\right)$ $\qquad 14x - 16 = 0$

$x = 8/7$

c# $\boxed{x = 4, 0, 8/7}$

(41) $S(x) = 12 + 4x - x^2 \quad [0,5] \qquad D: (-\infty, \infty)$

$S'(x) = 4 - 2x \qquad$ c# $+2, 0, 5$

$4 - 2x = 0$

$x = +2$

$S(+2) = 16 \qquad S(0) = 12 \qquad S(5) = 7$

absolute max $\qquad$ abs min

42, 44, 46

42) $f(x) = 5 + 54x - 2x^3 \quad [0, 4] \qquad D: (-\infty, \infty)$

$f'(x) = 54 - 6x^2$

$f'(x) = 0 \Rightarrow x^2 = 9$

$x = \pm 3$ but -3 is not in

C# 0, 3, 4

$f(0) = 5 \qquad f(3) = 113 \qquad f(4) = 93$

abs min　　abs max

44) $f(x) = x^3 - 6x^2 + 9x + 2 \quad [-1, 4] \qquad D: (-\infty, \infty)$

$f'(x) = 3x^2 - 12x + 9$

$f'(x) = 3(x^2 - 4x + 3)$　　C# 1, 3, -1, 4

$f'(x) = 3(x-1)(x-3)$

$f(-1) = -14 \qquad f(1) = 6 \qquad f(3) = 2 \qquad f(4) = 6$

abs min

absolute max

46) $f(x) = (x^2 - 1)^3 \quad [-1, 2] \qquad D: (-\infty, \infty)$

$f'(x) = 6x(x^2 - 1)^2$　　C# -1, 0, 1, 2

$f'(x) = 0 \quad x = 0$ or ± 1

$f(-1) = 0 \qquad f(0) = -1 \qquad f(1) = 0 \qquad f(2) = 27$

abs min　　abs max