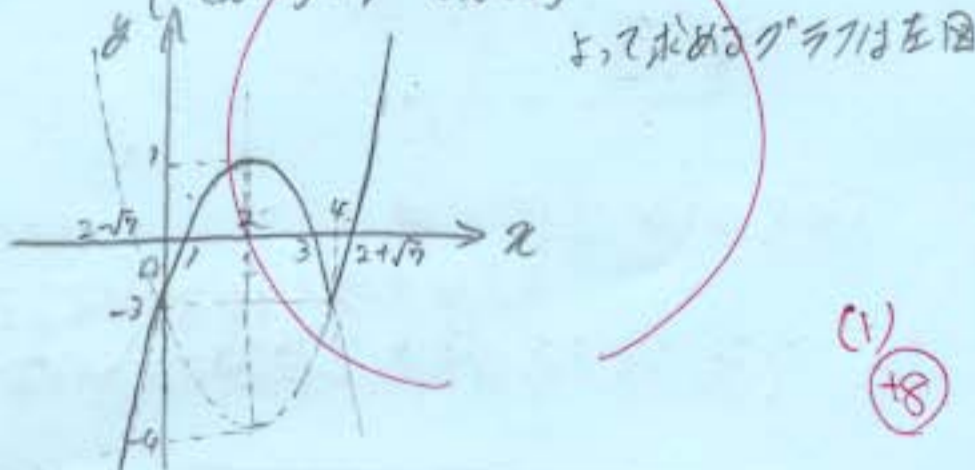


2 (1) $f(x) = x|x-4|-3$

$$= \begin{cases} x(x-4)-3 & (x \geq 4) \\ -x(x-4)-3 & (x < 4) \end{cases}$$

$$= \begin{cases} x^2-4x-3 & (x \geq 4) \\ -x^2+4x-3 & (x < 4) \end{cases}$$

$$= \begin{cases} (x-2)^2-7 & (x \geq 4) \\ -(x-2)^2+7 & (x < 4) \end{cases}$$



(1) +8

(2) $F(x) = \int_0^x f(t) dt$

i) $x \leq 4$ のとき

$$\begin{aligned} F(x) &= \int_0^x (-t^2+4t-3) dt \\ &= \left[-\frac{1}{3}t^3+2t^2-3t \right]_0^x \\ &= -\frac{1}{3}x^3+2x^2-3x \end{aligned}$$

ii) $x \geq 4$ のとき

$$\begin{aligned} F(x) &= \int_0^4 (-t^2+4t-3) dt + \int_4^x (t^2-4t-3) dt \\ &= \left[-\frac{1}{3}t^3+2t^2-3t \right]_0^4 + \left[\frac{1}{3}t^3-2t^2-3t \right]_4^x \\ &= \left(-\frac{64}{3}+32-12 \right) + \left(\frac{1}{3}x^3-2x^2-3x \right) - \left(\frac{64}{3}-32-12 \right) \\ &= \frac{1}{3}x^3-2x^2-3x+\frac{64}{3} \end{aligned}$$

ii) x)

$$F(x) = \begin{cases} -\frac{1}{3}x^3+2x^2-3x & (x \leq 4) \\ \frac{1}{3}x^3-2x^2-3x+\frac{64}{3} & (x \geq 4) \end{cases}$$

$$F_1(x) = -\frac{1}{3}x^3+2x^2-3x \quad (x \leq 4)$$

$$F_2(x) = \frac{1}{3}x^3-2x^2-3x+\frac{64}{3} \quad (x \geq 4)$$

$$F_1'(x) = -x^2+4x-3 = -(x-3)(x-1)$$

$$F_1'(x) = 0 \text{ のとき } x=1, 3$$

増減表は

x	1	3	4
$F_1'(x)$	-	+	-
$F_1(x)$	$\searrow -\frac{2}{3}$	$\nearrow 0$	$\searrow -\frac{8}{3}$

$$F_2'(x) = x^2-4x-3$$

$$F_2'(x) = 0 \text{ のとき } x = 2 \pm \sqrt{7}$$

x	4	$2+\sqrt{7}$
$F_2'(x)$	-	+
$F_2(x)$	$-\frac{4}{3}$	$10-\frac{14}{3}\sqrt{7}$

$$F_2(2+\sqrt{7}) = 10 - \frac{14}{3}\sqrt{7}$$

増減表より $F(x)$ の最小値は

$$\therefore x = 2+\sqrt{7} \text{ のとき } 10 - \frac{14}{3}\sqrt{7}$$

極大・極小の
明瞭かた、
増減表から Δ

(3) +8/9

(3) $F(x) - F(0)$

$$= \left(-\frac{64}{3}+32-12 \right) - \left(-\frac{1}{3}+2-3 \right)$$

$$= -\frac{64}{3}+30-9$$

$$= -21+21 = 0$$

$$\therefore F(x) - F(0) = 0$$

(2) +8