

الدرس الثالث: القيم العظمى والصغرى

«بسم الله الرحمن الرحيم»

الدرس (3): القيم العظمى والصغرى

أحمد من زعمي ص 78

$$2) f(x) = 6x^2 - 12x + 12$$

$$\Rightarrow f'(x) = 12x - 12 \Rightarrow f'(x) = m = 0$$

$$\Rightarrow 12x - 12 = 0$$

$$\Rightarrow \frac{12x}{12} = \frac{12}{12}$$

$$\Rightarrow x = 1$$

$$\Rightarrow f(1) = 6(1)^2 - 12(1) + 12$$

$$\Rightarrow f(1) = 6 - 12 + 12$$

$$\Rightarrow f(1) = 6$$

$$\Rightarrow (1, 6)$$

$$b) h(x) = \frac{2}{3}x^3 - 3x^2 + 4x + 3$$

$$\Rightarrow h'(x) = 2x^2 - 6x + 4 \Rightarrow h'(x) = m = 0$$

$$\Rightarrow \frac{2x^2 - 6x + 4}{2} = \frac{0}{2}$$

$$\Rightarrow x^2 - 3x + 2 = 0$$

$$\Rightarrow (x-2)(x-1) = 0$$

$$\Rightarrow x-2=0$$

$$\Rightarrow x=2$$

$$\Rightarrow h(2) = \frac{2}{3}(2)^3 - 3(2)^2 + 4(2) + 3$$

$$\Rightarrow h(2) = \frac{13}{3}$$

$$\Rightarrow (2, \frac{13}{3})$$

$$\Rightarrow x-1=0$$

$$\Rightarrow x=1$$

$$\Rightarrow h(1) = \frac{2}{3}(1)^3 - 3(1)^2 + 4(1) + 3$$

$$\Rightarrow h(1) = \frac{14}{3}$$

$$\Rightarrow (1, \frac{14}{3})$$

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تليين

$$1) f(x) = x^2 - 6x + 10$$

$$\Rightarrow f'(x) = 2x - 6 \Rightarrow f'(x) = m = 0$$

$$\Rightarrow 2x - 6 = 0$$

$$\Rightarrow 2x = 6$$

$$\Rightarrow x = 3$$

$$\Rightarrow f(3) = (3)^2 - 6(3) + 10$$

$$\Rightarrow f(3) = 1$$

$$\Rightarrow (3, 1)$$

$$2) f(x) = 2x^2 - 12x + 1$$

$$\Rightarrow f(x) = 2x^2 - 12x + 1$$

$$\Rightarrow f'(x) = 4x - 12 \Rightarrow f'(x) = m = 0$$

$$\Rightarrow 4x - 12 = 0$$

$$\Rightarrow 4x = 12$$

$$\Rightarrow x = 3$$

$$\Rightarrow f(3) = 2(3)^2 - 12(3) + 1$$

$$\Rightarrow f(3) = 2(9) - 12(3) + 1$$

$$\Rightarrow f(3) = 18 - 36 + 1$$

$$\Rightarrow f(3) = -18 + 1$$

$$\Rightarrow f(3) = -17$$

$$\Rightarrow (3, -17)$$

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$$3) f(x) = \frac{1}{3}x^3 - x$$

$$\Rightarrow f'(x) = x^2 - 1 \Rightarrow f'(x) = m = 0$$

$$\Rightarrow \sqrt{x^2} = \sqrt{1}$$

$$\Rightarrow x = 1$$

$$\Rightarrow x = -1$$

$$\Rightarrow f(1) = \frac{1}{3}(1^3) - (1)$$

$$\Rightarrow f(-1) = \frac{1}{3}(-1^3) - (-1)$$

$$\Rightarrow f(1) = \frac{1}{3} - 1$$

$$\Rightarrow f(-1) = \frac{1}{3}(-1) + 1$$

$$\Rightarrow f(1) = -\frac{2}{3}$$

$$\Rightarrow f(-1) = \frac{2}{3}$$

$$\Rightarrow (1, -\frac{2}{3})$$

$$\Rightarrow (-1, \frac{2}{3})$$

$$4) f(x) = \frac{1}{3}x^3 - x^2$$

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

$$\Rightarrow x^2 - 2x = 0$$

$$\Rightarrow x(x-2) = 0$$

$$\Rightarrow x = 0$$

$$\Rightarrow x - 2 = 0$$

$$\Rightarrow f(0) = \frac{1}{3}(0^3) - (0)^2$$

$$\Rightarrow x = 2$$

$$\Rightarrow f(0) = 0$$

$$\Rightarrow f(2) = \frac{1}{3}(2^3) - (2)^2 = \frac{8}{3} - 4 = -\frac{4}{3}$$

$$\Rightarrow (0, 0)$$

$$\Rightarrow (2, -\frac{4}{3})$$

أتحقق من نهايتي ⁸⁾

$$2) f(x) = 6x^2 - 6x + 12$$

$$\Rightarrow f'(x) = 12x - 6 \Rightarrow f'(x) = m = 0$$

$$\Rightarrow 12x - 6 = 0$$

$$\Rightarrow \frac{12x}{12} = \frac{6}{12}$$

لإيجاد النقاط الحرجية

zoom

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$\Rightarrow x_c = 0.5$
 $\Rightarrow f'(0) = 12(0) - 6 = -6$

$\therefore$ التناقص $\Leftarrow (-\infty, 0.5)$
 التزايد $\Leftarrow (0.5, \infty)$

b) $h(x) = x^3 - 3x^2 + 4x + 3$

$\Rightarrow h'(x) = 3x^2 - 6x + 4 \Rightarrow f'(x) = m = 0$

$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\Rightarrow x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(4)}}{2(3)}$

$\Rightarrow x = \frac{6 \pm \sqrt{-12}}{6}$ لا يوجد قيمة حقيقية $\rightarrow$ للمميز سالب

$\Rightarrow h'(0) = 3(0)^2 - 6(0) + 4$ أوجد أي قيمة

$\Rightarrow h'(0) = 4$

$\therefore$ التزايد $\Leftarrow (-\infty, \infty)$

تكملة: $S = 6$

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

$\Rightarrow f'(x) = 4$

$\therefore$ التزايد $\Leftarrow (-\infty, \infty)$

6) $f(x) = 7 - 5x$

$\Rightarrow f'(x) = -5$

$\therefore$ التناقص $\Leftarrow (-\infty, \infty)$

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أكتب من فهمي

$$2) f(x) = x^3 - 3x^2 - 9x - 1$$

$$\Rightarrow f'(x) = 3x^2 - 6x - 9 \Rightarrow f'(x) = 0$$

$$\Rightarrow 3x^2 - 6x - 9 = 0$$

$$\Rightarrow x^2 - 2x - 3 = 0$$

$$\Rightarrow (x-3)(x+1) = 0$$

$$\Rightarrow x = 3$$

$$\Rightarrow x = -1$$

$$\Rightarrow f(3) = 3^3 - 3(3)^2 - 9(3) - 1 \Rightarrow f(-1) = (-1)^3 - 3(-1)^2 - 9(-1) - 1$$

$$\Rightarrow f(3) = 9 - 27 - 27 - 1 \Rightarrow f(-1) = -1 - 3 + 9 - 1$$

$$\Rightarrow f(3) = -46$$

$$\Rightarrow f(-1) = 4$$

$$\Rightarrow (3, -46)$$

$$\Rightarrow (-1, 4)$$

$$b) f'(-2) = (-2)^3 - 3(-2)^2 - 9(-2) - 1$$

$$\Rightarrow f'(-2) = -3$$

$$\Rightarrow f'(0) = (0)^3 - 3(0)^2 - 9(0) - 1$$

$$\Rightarrow f'(0) = -1$$

$$\Rightarrow f'(4) = (4)^3 - 3(4)^2 - 9(4) - 1$$

$$\Rightarrow f'(4) = -21$$



∴ النقاط الحرجة: $(3, -46)$ و $(-1, 4)$ هي

نقاط انعطاف أفقي.