

$f(x) = \sqrt{x} + \sqrt{a-x}$, $f'(x) = \frac{1}{2\sqrt{x}} - \frac{1}{2\sqrt{a-x}}$
 $f'(x) = 0 \Rightarrow \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{a-x}} \Rightarrow x = a-x \Rightarrow x = \frac{a}{2}$
 $f''(x) = -\frac{1}{4x^{3/2}} + \frac{1}{4(a-x)^{3/2}}$
 $f''(\frac{a}{2}) = -\frac{1}{4(\frac{a}{2})^{3/2}} + \frac{1}{4(\frac{a}{2})^{3/2}} = 0$
 (Note: The handwritten notes indicate a local maximum at $x = \frac{a}{2}$.)

حل
 نسا \dots
 $k \in \mathbb{R} (a \in \mathbb{R}, a > 0)$

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$f(x) = \frac{\sqrt{a}}{p} + \sqrt{\frac{a-x}{q}}$, $f'(x) = \frac{1}{2\sqrt{q(a-x)}}$
 $f'(x) = 0 \Rightarrow \dots$

$\sqrt{\frac{a}{p}} + \sqrt{\frac{a-x}{q}} = \sqrt{\frac{a+x}{p}}$
 $\sqrt{\frac{a}{p}} + \sqrt{\frac{a-x}{q}} = \sqrt{\frac{a+x}{p}}$

$x > \frac{a}{2} \Rightarrow \dots$
 $x < \frac{a}{2} \Rightarrow \dots$

$x > \frac{a}{2} \Rightarrow f'(x) > 0 \Rightarrow f(x) \text{ is increasing}$
 $x < \frac{a}{2} \Rightarrow f'(x) < 0 \Rightarrow f(x) \text{ is decreasing}$

$$f(x) = M_1 a x^2 + M_2 b x + c$$

$$f(x) = a x^2 + b x + c = d \quad x=0 \quad d=0$$

$$x=1 \quad a+b+c=1$$

$$M_1 a x^2 + M_2 b x + c \quad x=0 \quad c=0$$

$$x=1 \quad M_1 a + M_2 b = 0$$

$$c=0 \quad a+b=1 \quad a+b=1 \quad x=0 \quad M_1 a + M_2 b = 0$$

$$M_1 a + M_2 b = 0$$

2

$$a b = M_1 x - M_2 = -4$$

✓

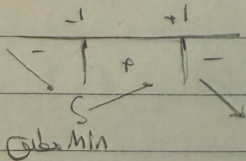
$$-b = -M_1 - b = M_2 \quad | a = -M_1$$

$$x \leq -\sqrt{2} \quad | \quad x \geq \sqrt{2}$$

$$x^2 \leq 2 \quad | \quad x^2 \geq 2$$

$$-\sqrt{2} < x < \sqrt{2}$$

$$M_1 x - 2^M \quad | \quad f(x) = M_1 x^2 - M_2 x^2 = M_1 (1-x^2) = 0$$



$$x=1 \quad M_1 - 1 - (-1) = -M_1$$

$$(-1) - (-1)$$

✓

3

$$-x^2 + M_1 a x^2 + b = y = -x^2 + 4a x$$

$$M_1 4a = 0 \quad | \quad 4a = -M_1 \quad | \quad a = -\frac{M_1}{4}$$

$$x^2 - \frac{M_1}{4} x^2 + b \quad x=1 \quad 1 - \frac{M_1}{4} + b = 1 \quad | \quad b = \frac{M_1}{4}$$

$$\frac{b}{a} = \frac{\frac{M_1}{4}}{-\frac{M_1}{4}} = -1$$

✓

4

4

ext. $(-b, -d) \rightarrow \frac{-b}{Pa} \cdot \frac{-d}{Pa} \rightarrow \frac{-b}{Pa} \cdot \frac{-1}{Pa} \rightarrow \frac{-d}{Pa} \cdot \frac{1}{Pa}$ ✓

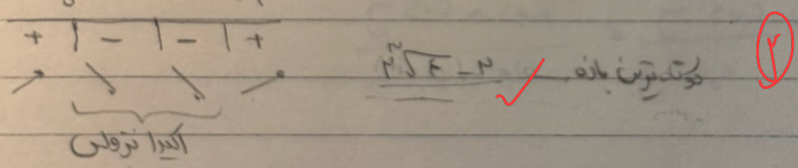
$\frac{a}{a+1} \cdot \frac{1}{n} = \frac{Pa \cdot Pa \cdot P}{a \cdot P}$ ✓

$\frac{P \cdot P \cdot P}{n \cdot n \cdot n} \rightarrow \frac{20 - P}{P} \cdot \left(\frac{-n}{P}\right) \cdot 0$ ✓

A. $(-\frac{1}{n}, \frac{1}{n})$ $f(-\frac{1}{n}) + a(-\frac{1}{n})$ also $-\frac{a}{n} \cdot P \rightarrow a \cdot P$ ✓
 ب. $\frac{b}{n} \cdot P \rightarrow b \cdot P$ $\frac{b}{a} \cdot \frac{1}{n} \cdot \frac{1}{n}$ ✓

$f(x) = \frac{2^x}{2^x - 1}$ $f'(x) = \frac{f(x)(2^x - 1) - (2^x)(2^x)}{(2^x - 1)^2}$ ✓

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



$f(x) = \frac{2^x - 1}{2^x - 1}$ $f'(x) = \frac{(2^x)(2^x - 1) - (2^x)(2^x)}{(2^x - 1)^2}$ ✓

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

