5 以下の方程式, 不等式を解け. ただし, 2次方程式は実数範囲で解くこと. 【**】

(1) $x^2 + 9x + 20 = 0$

$(x+5)(x+4) = 0$

$x = -4, -5$

(2) $4x^2 - 4x - 3 = 0$

$(2x-3)(2x+1) = 0$

$x = \dfrac{3}{2}, -\dfrac{1}{2}$

(3) $3x^2 - 3x - 4 = 0$

$x = \dfrac{3 \mp \sqrt{9 + 4 \cdot 3 \cdot 4}}{2 \cdot 3}$

$= \dfrac{3 \mp \sqrt{57}}{6}$

(4) $3(x-2)(x+5) = x^2 + 4x - 25$

$3(x^2 + 3x - 10) = x^2 + 4x - 25$

$3x^2 + 9x - 30 = x^2 + 4x - 25$

$2x^2 + 5x - 5 = 0$

$x = \dfrac{-5 \mp \sqrt{25 - 4 \cdot 2 \cdot (-5)}}{2 \cdot 2}$

$= \dfrac{-5 \pm \sqrt{65}}{4}$

(5) $x^4 - 1 = 0$

$(x^2-1)(x^2+1) = 0$

$(x-1)(x+1)(x^2+1) = 0$

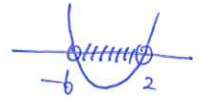$x = \pm 1$

(6) $x^3 + 1 = 0$

$(x+1)(x^2 - x + 1) = 0$

$x = -1$

(7) $x^2 + 4x - 12 < 0$

$(x+6)(x-2) < 0$

右図より

$-6 < x < 2$

(8) $x^2 - x - 12 \geqq 0$

$(x+3)(x-4) \geqq 0$
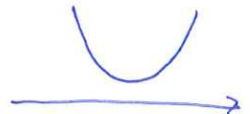
右図より

$x \leq -3, \ 4 \leq x$

(9) $2x^2 - 3x + 2 < 0$

$2x^2 - 3x + 2 = 0$ を解くと,

$x = \dfrac{3 \mp \sqrt{9 - 4 \cdot 2 \cdot 2}}{2 \cdot 2}$ ∴虚数解.

i.e. $2x^2 - 3x + 2 = 0$ は実数解をもたない.

右図から,

解なし

(10) $25x^2 - 40x + 16 > 0$

$(5x-4)^2 > 0$

右図から,

x は $\dfrac{4}{5}$ を除くすべての実数