1 以下の問いに答えよ. 【*】

(1) $A = a^2 - a + 1, B = 2a^2 + a, C = 2a - 1$ のとき, $(2B - 3C) - 3(A - C)$ を計算せよ.

$= 2B - 3C - 3A + 3C$
$= 2B - 3A$
$= 2(2a^2 + a) - 3(a^2 - a + 1)$
$= 4a^2 + 2a - 3a^2 + 3a - 3$
$= \underline{a^2 + 5a - 3}$

(2) $(x - y)^2(x + y)^2$ を展開せよ.

$= ((x - y)(x + y))^2$
$= (x^2 - y^2)^2$
$= \underline{x^4 - 2x^2y^2 + y^4}$

(3) $12x^2 - xy - 6y^2$ を因数分解せよ.

$\underline{(3x + 2y)(4x - 3y)}$

(4) $|-5| + ||3| - |-6||$ の値を求めよ.

$\cdot |-5| = 5$
$\cdot ||3| - |-6|| = |3 - 6|$
$\qquad\qquad = |-3| = 3.$
$\therefore (与式) = 5 + 3 = \underline{8}$

(5) $\dfrac{1}{3 + \sqrt{3}} + \dfrac{1}{3 - \sqrt{3}}$ を計算せよ.

$\dfrac{1}{3 + \sqrt{3}} = \dfrac{1}{3 + \sqrt{3}} \times \dfrac{3 - \sqrt{3}}{3 - \sqrt{3}} = \dfrac{3 - \sqrt{3}}{9 - 3} = \dfrac{3 - \sqrt{3}}{6}$

$\dfrac{1}{3 - \sqrt{3}} = \dfrac{1}{3 - \sqrt{3}} \times \dfrac{3 + \sqrt{3}}{3 + \sqrt{3}} = \dfrac{3 + \sqrt{3}}{9 - 3} = \dfrac{3 + \sqrt{3}}{6}$

$\therefore (与式) = \dfrac{3 - \sqrt{3}}{6} + \dfrac{3 + \sqrt{3}}{6} = \dfrac{6}{6}$
$\qquad\qquad = \underline{1}$

(6) 不等式 $\dfrac{2 - 5x}{2} + 3 \geqq \dfrac{7x - 4}{3}$ を解け.

両辺に 6 をかけて
$6\left(\dfrac{2 - 5x}{2} + 3\right) \geqq 6 \cdot \dfrac{7x - 4}{3}$
$3(2 - 5x) + 18 \geqq 2(7x - 4)$
$6 - 15x + 18 \geqq 14x - 8$
$32 \geqq 19x$
$\underline{x \leqq \dfrac{32}{19}}$

(7) 方程式 $|2x + 1| = 3$ を解け.

$2x + 1 = 3$ or $2x + 1 = -3.$ より
$\underline{x = 1, -2}$

(8) $\sqrt{5}$ の整数部分を a, 小数部分を b とする. $\dfrac{1}{b} - \dfrac{1}{a + b}$ の値を求めよ.

$2 < \sqrt{5} < 3$ より.
$a = 2.$ $b = \sqrt{5} - 2.$, $a + b = \sqrt{5}$
$\dfrac{1}{b} = \dfrac{1}{\sqrt{5} - 2} = \dfrac{1}{\sqrt{5} - 2} \times \dfrac{\sqrt{5} + 2}{\sqrt{5} + 2}$
$\qquad = \sqrt{5} + 2.$
$\dfrac{1}{a + b} = \dfrac{1}{\sqrt{5}} = \dfrac{\sqrt{5}}{5}$
$\therefore \dfrac{1}{b} - \dfrac{1}{a + b} = \sqrt{5} + 2 - \dfrac{\sqrt{5}}{5} = \underline{\dfrac{4\sqrt{5} + 2}{5}}$