

次の2次関数の頂点の座標と軸の式を求めなさい。

(1) $y = x^2 + x$

(2) $y = x^2 - x + 3$

(3) $y = x^2 - 2x - 1$

(4) $y = 2x^2 + 8x + 1$

(5) $y = -x^2 + x$

(6) $y = -x^2 - 2x - 2$

(7) $y = -3x^2 + 6x + 1$

(8) $y = -2x^2 - 3x - 3$

(1) $y = (x + \frac{1}{2})^2 - \frac{1}{4}$

頂点 $(-\frac{1}{2}, -\frac{1}{4})$

軸 $x = -\frac{1}{2}$

(2) $y = (x - \frac{1}{2})^2 - \frac{1}{4} + \frac{12}{4}$

$y = (x - \frac{1}{2})^2 + \frac{11}{4}$

頂点 $(\frac{1}{2}, \frac{11}{4})$ 軸 $x = \frac{1}{2}$

(3) $y = (x - 1)^2 - 2$

頂点 $(1, -2)$

軸 $x = 1$

(4) $y = 2(x^2 + 4x) + 1$

$y = 2(x + 2)^2 - 7$

頂点 $(-2, -7)$

軸 $x = -2$

(5) $y = -(x^2 - x)$

$y = -(x - \frac{1}{2})^2 + \frac{1}{4}$

頂点 $(\frac{1}{2}, \frac{1}{4})$

軸 $x = \frac{1}{2}$

(6) $y = -(x^2 + 2x) - 2$

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

頂点 $(-1, -1)$

軸 $x = -1$

(7) $y = -3(x^2 - 2x) + 1$

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

頂点 $(1, 4)$

軸 $x = 1$

(8) $y = -2(x^2 + \frac{3}{2}x) - 3$

$y = -2(x + \frac{3}{4})^2 + \frac{9}{8} - \frac{24}{8}$

$y = -2(x + \frac{3}{4})^2 - \frac{15}{8}$

頂点 $(-\frac{3}{4}, -\frac{15}{8})$

軸 $x = -\frac{3}{4}$