

exam

① ~~Yes it's prime.~~ Yes it's prime.

② $(x-1)^5$

$$1(x)^5(-1)^0 + 5(x)^4(-1)^1 + 10(x)^3(-1)^2 + 10(x)^2(-1)^3 + 5(x)^1(-1)^4 + 1(x)^0(-1)^5$$

$$\rightarrow 1 \quad 5 \quad 10 \quad 10 \quad 5 \quad 1$$

$$= x^5 - 5x^4 + 10x^3 - 10x^2 + 5x - 1$$

③ $3x^2 + x = 0$

$$3x^2 = -x$$

$$3 = -\frac{x}{x^2}$$

$3x^2 + x = 0$

$$3x^2 = -x$$

$$3 = -\frac{x}{x^2}$$

$$-\frac{x}{x^2} = 3$$

④ $3x^2 + x > 0$

$$3x^2 > -x$$

$$3 > -\frac{x}{x^2}$$

⑤ $x^3 - 7x^2 + 7x + 15 = 0$

$$x = -1$$

$$x = 5$$

$$x = 3$$

$$(x+1)(x-5)(x-3) = 0$$

$$\boxed{x = 5}$$

$$x \neq -1$$

$$x \neq 3$$

⑥ $x^3 - 7x^2 + 7x + 15 > 0$

$$x > -1$$

$$x > 5$$

$$x > 3$$

$$\boxed{x > 5}$$

⑦ $\frac{a^6 - b^6}{a^3 + b^3} \rightarrow a^6 - b^6 \div a^3 + b^3$

$$= a^3 - b^3$$

$$= (a-b)(a^2 + ab + b^2)$$

$$= (a^3 - b^3)(a^3 + (a^3 - b^3) - b^6)$$

$$= a^9 + a^6 - ab^6 - ab^9 - ab^9 - ab^6 + b^9$$

$$= -2ab^9 + a^9 - 2ab^6 + b^9 + a^6$$

⑩ co-efficients

$$1 \quad -1 \quad 2 \quad -2 \quad | \quad 1 \quad -2 \quad 2 \quad -4$$

1 step: $1 \quad -1 \quad 2 \quad -2$

$$-1 \quad -2 \quad 2 \quad -4$$

$$0 \quad 1 \quad 0 \quad 2$$

2 step:

$$\begin{array}{cccc} 1 & 0 & 2 & \\ -1 & -2 & 2 & -4 \\ 0 & 2 & 0 & 2 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & 2 & -4 \\ -1 & 0 & 2 & \end{array}$$

$$0 \quad -2 \quad 0 \quad -4$$

$$x = \sqrt{2}$$

$$(x - \sqrt{2})$$

⑪ $-3x^2 - 3x + 1 = 0$

$$x = \frac{-3 + \sqrt{21}}{6}$$

$$x = \frac{-3 - \sqrt{21}}{6}$$

$$x \geq \frac{-3 + \sqrt{21}}{6}$$

$$x \geq \frac{-3 - \sqrt{21}}{6}$$

⑫ vertical

$$y = \overset{a}{1}x^2 + \overset{b}{1}x + \overset{c}{4}$$

• ~~vertex~~
• vertex $(-\frac{b}{2a}, -\frac{\Delta}{4a})$

$$= -\frac{x}{2(x)^2}, \quad -(b^2 - 4ac) = -(x^2 - 4(x^2)(4))$$

$$\frac{-x^2 + 16x^2}{4(x^2)}$$

= -

(12) • vertical

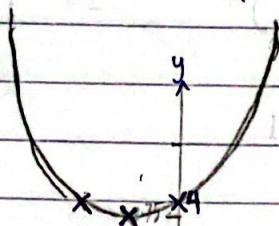
• U

• vertex $(-\frac{b}{2a}, -\frac{\Delta}{4a})$

$$(-\frac{1}{2(1)}, -\frac{1^2 - 4(1)(4)}{4(1)})$$

$$(-\frac{1}{2}, \frac{15}{4})$$

axis $x = -\frac{1}{2}$



$$\begin{aligned} & \Delta = b^2 - 4ac \\ & = (1)^2 - 4(1)(4) \\ & = 1 - 16 \\ & = -15 \end{aligned}$$

$$\begin{aligned} x &> -\frac{1}{2} = 0 \dots \\ x &< -\frac{1}{2} = -1 \dots \end{aligned}$$

$$\therefore y = 1(0)^2 + 1(0) + 4 = 4 \quad (0, 4)$$

$$\begin{aligned} \therefore y &= 1(-1)^2 + 1(-1) + 4 = 1 - 1 + 4 = 4 \quad (-1, 4) \end{aligned}$$

⑬ $x^2 + y^2 + 2x + 2y + 1 = 0$

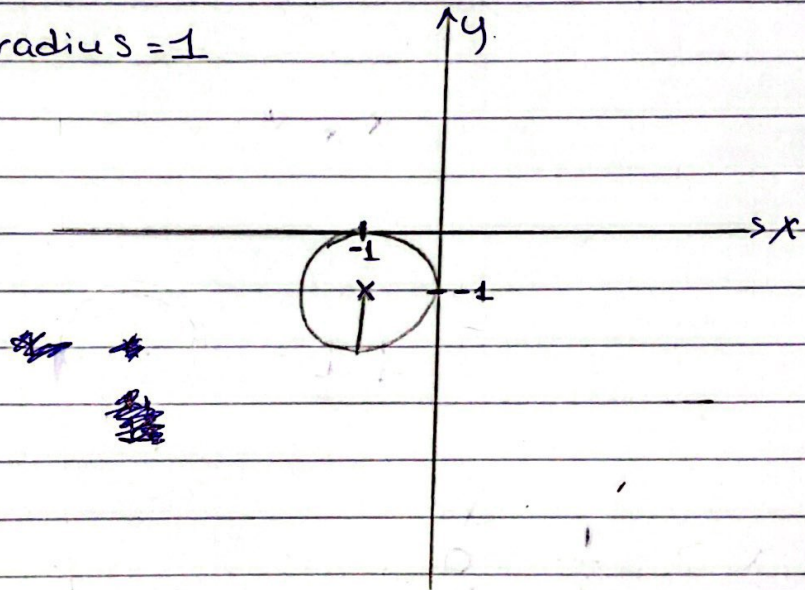
note • $(x-h)(y-k) = r^2$
• radius = r center (h,k)

$$\underbrace{x^2 + 2x}_{\left(\frac{2}{2}\right)^2} + \underbrace{y^2 + 2y}_{\left(\frac{2}{2}\right)^2} + 1 = 0$$

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

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

center (-1,-1) radius = 1



⑭ $f(x) = x^2 - 2x$
 $f(2) = 2^2 - 2(2)$
 $= 4 - 4$

~~$f^{-1}(1) = 1 - 1 = 0$~~

$f^{-1}(1) = x^2 - 2x$

$f(x) = x^2 - 2x$

$y = x^2 - 2x$

$x = y^2 - 2y$

$\sqrt{\frac{x}{-2}} = y - y$

$\sqrt{\frac{-1}{-2}} = y$

$y = \frac{\sqrt{2}}{2}$

$f^{-1}(1) = \frac{\sqrt{2}}{2}$

(15) $\frac{\sqrt{7} + \sqrt{2}}{\sqrt{7} - \sqrt{2}} = \frac{(7 + \sqrt{2})(7 + \sqrt{2})}{(7 - \sqrt{2})(7 + \sqrt{2})} = \frac{9 + 2\sqrt{14}}{5}$

$= \frac{1}{5} (9 + 2\sqrt{14})$

$= \frac{9 + 2\sqrt{14}}{5}$