TUGAS KELOMPOK

RESPONSI 9

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Kelompok 9:

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1. titik puncak, Fokus, direktriks parabola.

a. $(x+2)^2 = 8(y-1)$

$(x-h)^2 = 4p(y-k)$

$\Rightarrow h = -2 \; ; k = 1 \; ; p = 2$

titik puncak $= (-2, 1)$

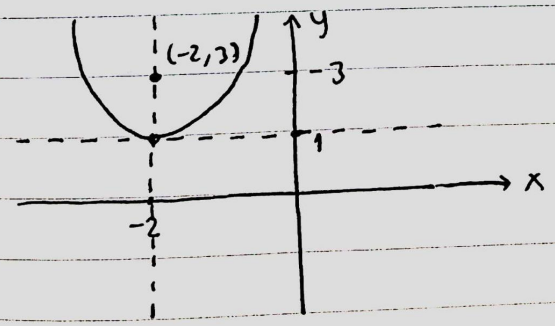
Fokus $= (h, p+k) = (-2, 3)$

Direktriks: $y - k = -p$

$y = k - p$

$= 1 - 2$

$= -1$



b. $4x^2 + 16x - 16y + 32 = 0$

$\Rightarrow 4(x^2 + 4x) - 16(y-2) = 0$

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

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

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

$(x-h)^2 = 4p(y-k)$

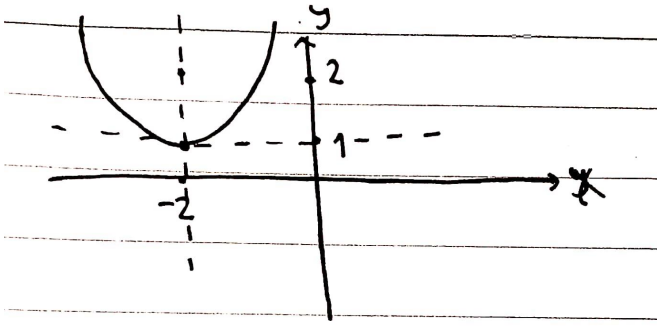
$(x-(-2))^2 = 4(1)(y-1)$

$\Rightarrow h = -2 \; ; k \; ; 1 \; ; p = 1$

titik puncak $= (-2, 1)$

Fokus $= (-2, 2)$

direktriks $= y = k - p = 1 - 1 = 0$



② a) $\frac{(x+3)^2}{4} + \frac{(y+2)^2}{16} = 1$

$\frac{(x+3)^2}{2^2} + \frac{(y+2)^2}{4^2} = 1$

Puncak $(h, \pm a + k)$

fokus $(h, k \pm c)$

↳ $h = -3$

$k = -2$

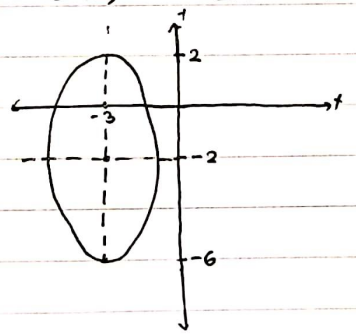
$c = \sqrt{a^2 - b^2} = \sqrt{16-4} = \sqrt{12}$

↳ke-eksentrikan $e = \frac{c}{a} = \frac{\sqrt{12}}{4}$

$= \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$

↳ puncak $= (-3, -2 \pm 4) \Rightarrow (-3, 2)$ dan $(-3, -6)$

↳ fokus: $(-3, -2 \pm \frac{\sqrt{3}}{2}) \Rightarrow (-3, -5.46)$ dan $(-3, 1.464)$



b) $x^2 + 4y^2 - 2x + 16y + 1 = 0$

$x^2 - 2x + 4y^2 + 16y + 1 = 0$

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

$(x-1)^2 + 4(y+2)^2 = -1 + 16 + 1$

$\frac{(x-1)^2}{16} + \frac{4}{16}(y+2)^2 = 1$

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

↳ $h = 1$

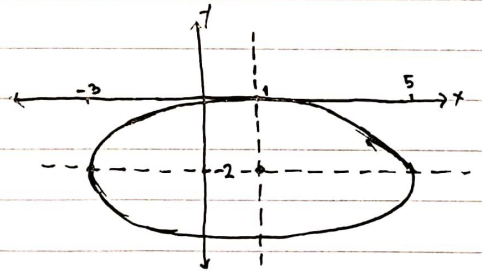
$k = -2$

$c = \sqrt{a^2 - b^2} = \sqrt{16-4} = \sqrt{12}$

↳ ke-eksentrikan $e = \frac{c}{a} = \frac{\sqrt{12}}{4} = \frac{\sqrt{3}}{2}$

↳ puncak $= (1 \pm 4, -2) \Rightarrow (5, -2)$ dan $(-3, -2)$

↳ fokus $= (1 \pm \sqrt{12}, -2) \Rightarrow (4.46, -2)$ dan $(-2.46, -2)$



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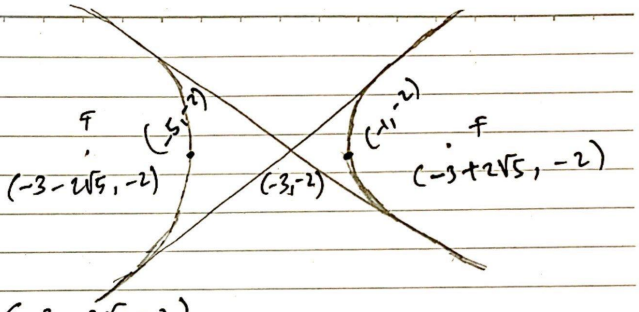
13 a) $\frac{(x+3)^2}{4} - \frac{(y+2)^2}{16} = 1$

$a = 2$ $\quad h = -3$

$b = 4$ $\quad k = -2$

$c = \sqrt{20} = 2\sqrt{5}$



fokus : $(h \pm c, k)$

: $(-3 \pm 2\sqrt{5}, -2)$

: $(-3+2\sqrt{5}, -2)$ & $(-3-2\sqrt{5}, -2)$

Titik Puncak : $(h \pm a, k)$

: $(-3 \pm 2, -2)$

: $(-1, -2)$ & $(-5, -2)$

Asimtot : $y - k = \pm (b/a)(x - b)$

$y + 2 = \pm 2(x+3)$

$y = 2x + 4$ & $y = -2x - 8$

3b) $9x^2 - 16y^2 + 54x + 64y - 127 = 0$

$9x^2 + 54x - 16y^2 + 64y - 127 = 0$

$9(x+3)^2 - 81 - 16(y-2)^2 + 64 - 127 = 0$

$9(x+3)^2 - 16(y-2)^2 = 144$

$\frac{(x+3)^2}{16} - \frac{(y-2)^2}{9} = 1$

Asimtot : $y - k = \pm \left(\frac{b}{a}\right)(x-h)$

$y - 2 = \pm \left(\frac{3}{4}\right)(x+3)$

$y_1 = \frac{3}{4}x + \frac{17}{4}$ $\quad y_2 = \frac{-3}{4}x - \frac{1}{4}$

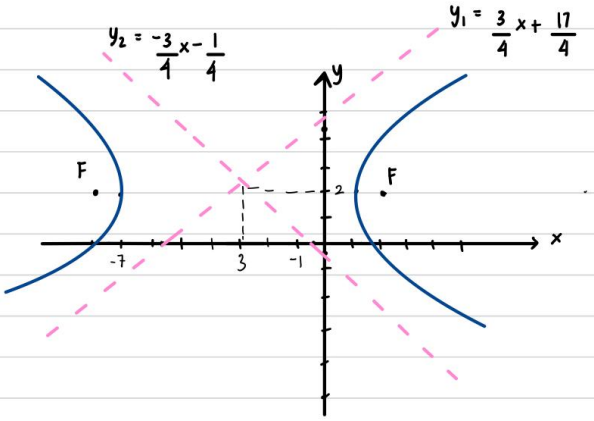
$a = 4$ $\quad b = 3$ $\quad h = -3$ $\quad k = 2$ $\quad c = \sqrt{16+9} = 5$

Titik puncak : $(h \pm a, k)$

: $(1, 2)$ dan $(-7, 2)$

Titik Fokus : $(h \pm c, k)$

: $(2, 2)$ dan $(-8, 2)$



4. Tentukan persamaan irisan kerucut berikut :

a. Parabola dengan puncak di (2,3) dan fokus di (2,5)

→ Puncak ⇝ (h,k) → Fokus ⇝ (h, p+k)

(2,3) → h=2 (2,5) ⇝ h=2

k=3 p+k=5

p+3=5

p = 2

→ Persamaan parabola

$(x-h)^2 = 4p(y-k)$

$(x-2)^2 = 4.2(y-3)$

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

b.) Parabola dengan sumbu parabola vertikal, serta melalui titik $(-2,3), (0,3), (1,9)$.

jawab:

» Berdasarkan titik yang diberikan, sumbu parabola → vertikal.

Persamaan: $(x-h)^2 = 4p(y-k)$

Direktriks: $y = k-p$

Fokus : $(h, p+k)$

Puncak : (h,k)

» Evaluasi Titik

$x=-2$, $x=0$ } $y=3$ → maka, $(-2-h)^2 = (0-h)^2$

$h^2 + 4h + 4 = h^2$

$4h = -4$

$h = -1$

Maka persamaan menjadi $(x+1)^2 = 4p(y-k)$

melalui $(1,9)$ → $4 = 4p(9-k)$

melalui $(0,3)$ → $1 = 4p(3-k)$

$\frac{4p(9-k)}{4p(3-k)} = \frac{4}{1} \rightarrow \frac{9-k}{3-k} = \frac{4}{1}$

$9-k = 12-4k$

$3k = 3$

$k = 1$

Persamaan → $(x+1)^2 = 4p(y-1)$

melalui $(0,3)$ → $1 = 4p(2)$

$1 = 8p$

$p = \frac{1}{8}$ //

Persamaan parabola:

$(x+1)^2 = 4 \cdot \frac{1}{8}(y-1)$

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

9. Elips dengan fokus $(\pm 2, 2)$ dan yang melalui titik asal

Karena fokus di $(\pm 2, 2)$ maka titik pusat berada di $(0, 2)$

Titik pusat $= (h, k) = (0, 2)$, maka $h = 0$; $k = 2$

Fokus $= (h \pm c, k) = (\pm 2, 2)$

$h \pm c = \pm 2$

$0 \pm c = \pm 2$

$c = 2$

Persamaan

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

Uji dgn titik asal $(0,0)$

$$\frac{(0-h)^2}{a^2} + \frac{(0-2)^2}{b^2} = 1$$

$$b^2 = 4 \Rightarrow b = 2$$

$a = \sqrt{c^2 + b^2}$

$a = \sqrt{4 + 4}$

$a = \sqrt{8}$

$a^2 = 8$

Persamaan Irisan Kerucutnya =

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

$$\frac{x^2}{8} + \frac{(y-2)^2}{4} = 1$$

d. Hiperbola dengan puncak di (0,0) dan (0,6), dengan sebuah fokus di (0,8).

Karena puncak berada pada koordinat x yang sama, berarti persamaan hiperbolanya $\Rightarrow \frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Puncak $\Rightarrow (h, k \pm a)$

$(0,6) \rightarrow (h, k+a) \rightarrow h = 0$

$(0,0) \rightarrow (h, k-a) \rightarrow k-a = 0$ dan $k+a = 6$ maka $k = 3$ dan $a = 3$

Fokus $\Rightarrow (h, k \pm c)$

$(0,8) \rightarrow (h, k+c)$

karena (0,8) diatas titik pusat, $k+c = 8$, $3+c = 8$, $c = 5$

titik pusat : $(\frac{0+0}{2}, \frac{0+6}{2})$ atau (h,k)

maka titik pusat = (0, 3)

$b = \sqrt{c^2 - a^2} = \sqrt{5^2 - 3^2} = 4$

maka didapat pers hiperbolanya adalah

$$\frac{(y-3)^2}{9} - \frac{(x-0)^2}{16} = 1$$