TUGAS KELOMPOK MINGGU 9

KALKULUS II

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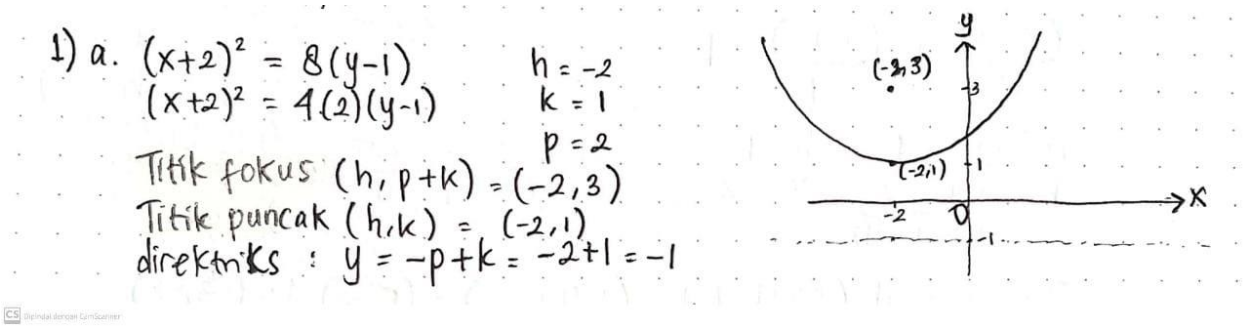
Nomor 1a.



Nomor 1b.

(16) Tentukan titik puncak, fokus, dan direktris

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

$4(x^2 + 4x) - 16y = -32$

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

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

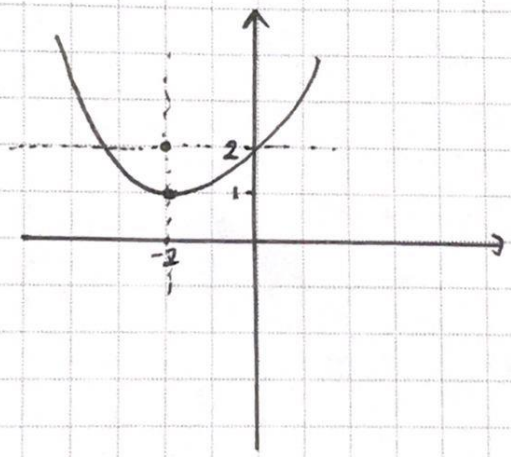
$(x+2)^2 - 4 = 4y - 8$

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

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

sehingga
$h = -2$
$p = 1$
$k = 1$

Titik puncak : $(h,k) = (-2,1)$
fokus : $(h, p+k) = (-2,2)$
direktris : $y = k - p = 0$



Nomor 2a.

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

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

$a = 4$

$b = 2$

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

$= \sqrt{4^2 - 2^2}$

$= 2\sqrt{3}$

Titik Pusat $(-3, -2)$

Titik puncak mayor

$(h, k \pm a) = (-3, -2+4) = (-3, 2)$

$(-3, -2-4) = (-3, -6)$

Titik Puncak Minor

$(h \pm b, k) = (-3+2, -2) = (-1, -2)$

$(-3-2, -2) = (-5, -2)$

Titik Fokus

$(h, k \pm c) = (-3, -2+2\sqrt{3})$

$(-3, -2-2\sqrt{3})$

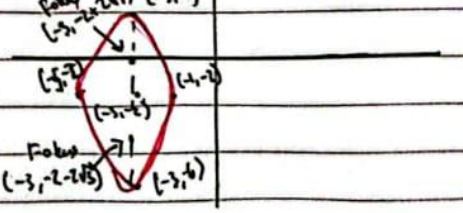
Eksentrikon

$e = \frac{c}{a}$

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

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

$= 0.866$



Nomor 2b.

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

$\Rightarrow (x^2 - 2x) + 4(y^2 + 4y) + 1 = 0$

$\Rightarrow (x-1)^2 - 1 + 4(y+2)^2 - 16 + 1 = 0$

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

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

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

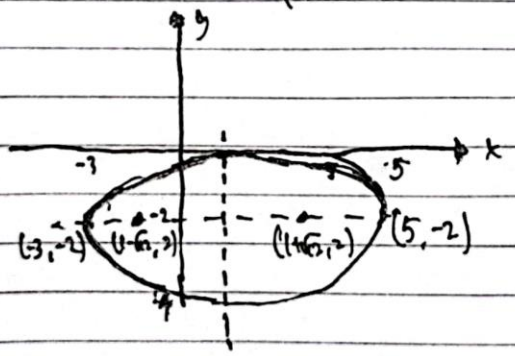
$\Rightarrow a = 4,\ b = 2,\ c = \sqrt{12},\ h = 1,\ k = -2$

$\Rightarrow$ • Titik Puncak : $(h \pm a, k) = (1 \pm 4, -2) = (5, -2)(-3, -2)$

• fokus : $= (h \pm c, k) = (1 \pm \sqrt{12}, -2) = (1 + \sqrt{12}, -2)(1 - \sqrt{12}, -2)$

• kecksentrikan $= \frac{c}{a} = \frac{\sqrt{12}}{4} = \frac{1}{2}\sqrt{3}$

• gambar :



Nomor 3a.

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

↳ Bentuk umum : $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

↳ maka : $a = \sqrt{4} = 2$ $\quad h = -(3) = -3$

$b = \sqrt{16} = 4$ $\quad k = -(2) = -2$

$c = \sqrt{4+16} = \sqrt{20} = 2\sqrt{5}$

↳ Titik fokus : $(h \pm c, k)$

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

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

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

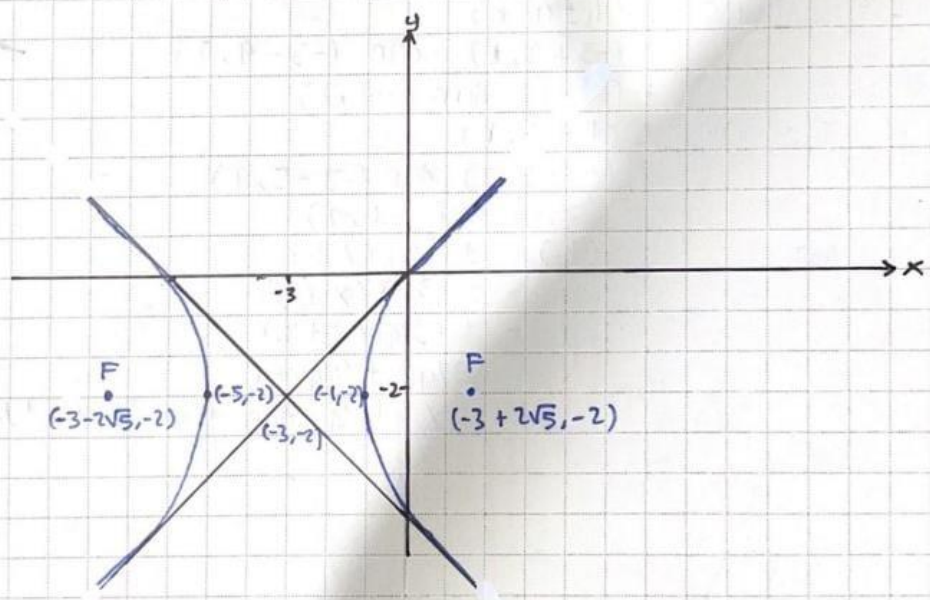
asimtot : $y - k = \pm (b/2)(x - h)$

$y - (-2) = \pm (4/2)(x - (-3))$

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

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

↳



Nomor 3b.

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

↳ $9x^2 - 16y^2 + 54x + 64y = 127$

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

$9(x^2 + 6x) - 16(y^2 - 4y) = 127$

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

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

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

$\frac{9(x+3)^2}{144} - \frac{16(y-2)^2}{144} = 1$

$\frac{(x+3)^2}{16} - \frac{(y-2)^2}{9} = 1 \Rightarrow \frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

↳ maka : $a = \sqrt{16} = 4$ $\quad h = -(3) = -3$

$b = \sqrt{9} = 3$ $\quad k = -(-2) = 2$

$c = \sqrt{16+9} = 5$

↳ Titik puncak : $(h \pm a, k)$

: $(-3+4, 2)$ dan $(-3-4, 2)$

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

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

: $(-3+5, 2)$ dan $(-3-5, 2)$

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

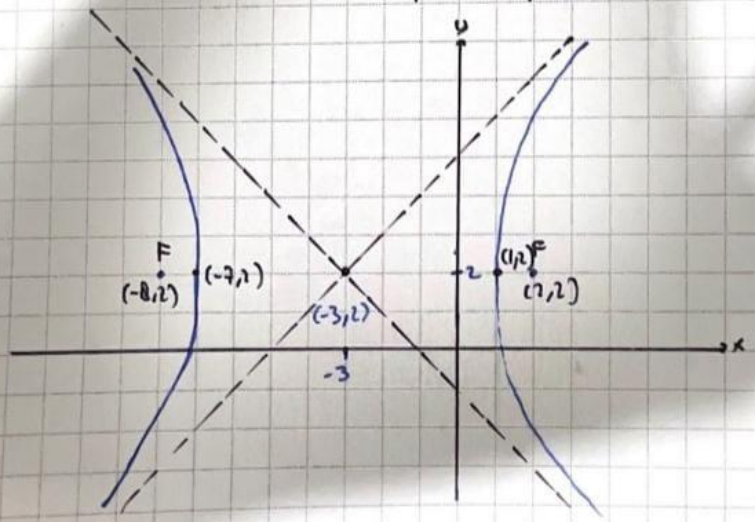
Asimtot : $(y-k) = \pm (b/a)(x-h)$

$(y-2) = \pm (3/4)(x-(-3))$

$y-2 = \pm (3/4)(x+3)$

$y = \pm 3/4x \pm 9/4 + 2$

$y = 3/4x + 13/4$ dan $y = -3/4x - 1/4$



Nomor 4a.

(4) a) Tentukan persamaan irisan kerucut berikut :

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

* Puncak (2,3) → (h,k)

Fokus (2,5) → (h, p+k)

* Maka, • h = 2 • p + k = 5

• k = 3 p + 3 = 5

p = 2

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

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

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

$x^2 - 4x + 4 = 8y - 24$

$x^2 - 4x - 8y + 28 = 0$

Nomor 4b.

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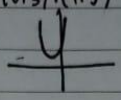
DATE

4b Parabola melalui titik (-2,3), (0,3), (1,0)

↳ vertikal: $(x-h)^2 = 4p(y-k)$



↳ substitusi tiap titik ke persamaan:

$(-2-h)^2 = 4p(3-k)$

$4+4h+h^2 = 12p-4pk$ ... (I)

$(0-h)^2 = 4p(3-k)$

$h^2 = 12p-4pk$ ... (II)

$(1-h)^2 = 4p(0-k)$

$1-2h+h^2 = 36p-4pk$ ... (III)

↳ eliminasi persamaan (I) dan (II):

$4+4h+h^2 = 12p-4pk$

$h^2 = 12p-4pk$ −

$4+4h = 0$

$4h = -4$

$h = -1$

↳ eliminasi persamaan (III) dan (II):

$1-2h+h^2 = 36p-4pk$

$h^2 = 12p-4pk$ −

$1-2h = 24p$

$2h+24p = 1$

$2(-1)+24p = 1$

$24p = 3$

$p = 1/8$

↳ substitusi h dan p ke persamaan (I):

$(-2+1)^2 = 4(1/8)(3-k)$

$1 = 3/2 - 1/2\,k$

$1/2\,k = 1/2$

$k = 1$

↳ maka, didapat $p = 1/8$; $k = 1$

↳ persamaan:

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

$(x+1)^2 = 1/2\,(y-1)$

Nomor 4c.

No.

Date:

4. c. Fokus $(\pm 2, 2)$

lingkaran melalui $(0,0)$ Puncak minor

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

$k = 2$

Puncak Minor

$(h, k \pm b) \Rightarrow (0,0)$ $(0, k+b)$

$h = 0$

* $k - b = 0$

$2 - b = 0$

$b = 2$

* $a^2 = c^2 + b^2$

$= 4 + 4$

$= \sqrt{8}$

$= 2\sqrt{2}$

* $h \pm c = \pm 2$

$0 \pm c = \pm 2$

$c = 2$

Persamaan

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

$$\frac{(x-0)^2}{(2\sqrt{2})^2} + \frac{(y-2)^2}{2^2} = 1 \Rightarrow \frac{(x-0)^2}{8} + \frac{(y-2)^2}{4} = 1$$

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

Nomor 4d.

④ d) Hiperbola dengan puncak di (0,0) dan (0,6), dan dengan sebuah fokus di (0,8)

※ Titik puncak (0,0) dan (0,6) → $(h, k \pm a)$

Fokus (0,8) → $(h, k+c)$

※ Maka, • $h = 0$

• $k+a = 6$

$k-a = 0$ +

$2k = 6$

$k = 3$

• $k-a = 0$

$3-a = 0$

$a = 3$

• $k+c = 8$

$3+c = 8$

$c = 5$

• $b = \sqrt{5^2-3^2}$

$b = 4$

※ Persamaan Hiperbola :

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

$$\frac{(y-3)^2}{3^2} - \frac{(x-0)^2}{4^2} = 1$$

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

$$-9x^2 + 16y^2 - 96y = 0$$