Name Jamile Ali Kaddoura, ID G00097411

$\frac{15}{15}$

MTH 111, Quiz 1

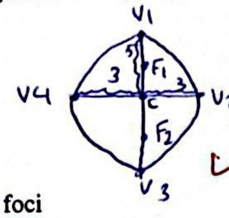
Ayman Badawi

QUESTION 1. Consider the ellipse $\frac{(x-1)^2}{9} + \frac{(y-4)^2}{25} = 1$.

$c = (1,4)$

(i) Roughly, sketch the curve.

$\frac{2}{2}$



$\left(\frac{k}{2}\right)^2 = 25$

$\frac{k}{2} = 5$

$k = 10$

$b^2 = 9$

$b = 3$

$V_1 = (1, 4+5) = (1,9)$

$V_3 = (1, 4-5) = (1,-1)$

$V_2 = (1+3, \cancel{5}\,4) = (4, \cancel{5}4)$

$V_4 = (1-3, 4) = (-2, 4)$

(ii) Find the foci

$\frac{2}{2}$

$\sqrt{25-9} = \sqrt{16} = 4$

$F_1 = (1,8)$

$F_2 = (1,0)$

$F_1 = (1, 4+4) = (1,8)$

$F_2 = (1, 4-4) = (1,0)$

(iii) Find all 4 vertices.

$\frac{4}{4}$

$V_1 = (1,9)$ $V_2 = (4,4)$

$V_3 = (1,-1)$ $V_4 = (-2,4)$

(iv) Find the ellipse constant, k.

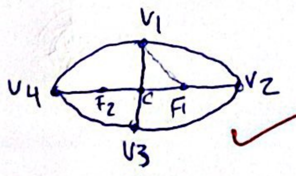
$\frac{1}{1}$

$k = 10$

QUESTION 2. Given $f_1 = (2, 5)$ is one of the foci of an ellipse, (-1, 9) and (4, 5) are two vertices of the same ellipse.

(i) STARE well at the qiven info. in the question, then roughly sketch such ellipse

$\frac{2}{2}$



(ii) Find c, the center of the ellipse, and find f_2, the second focus.

$\frac{2}{2}$

$F_2 = (-4, 5)$ $c = (-1, 5)$

$c = \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$

$c = \frac{-2}{2}, 5$

$c = (-1, 5)$

(iii) Find the equation of the ellipse.

$\frac{2}{2}$

$$\frac{(x+1)^2}{25} + \frac{(y-5)^2}{16} = 1$$

$V_4 = (-6, 5)$

$CF_1 = \sqrt{\left(\frac{k}{2}\right)^2 - b^2}$

$3^2 = \sqrt{25-b^2}^{\,2}$

$9 = 25 - b^2$

Name Jamila Ali Kaddoura, ID G00097411

MTH 111, Quiz 2

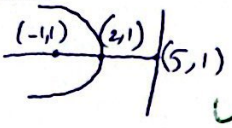
Ayman Badawi

15/15

QUESTION 1. Consider the parabola $-12(x-2)=(y-1)^2$.

(i) Roughly, sketch the curve.

2



$4d = -12$

$d = \frac{-12}{4} = -3$

$|d| = 3$

focus $= 2-3 = -1$

dline $= 2+3 = 5$

(ii) Find the focus

2 $(-1,1)$

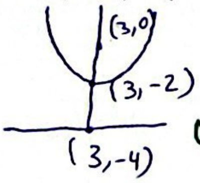
(iii) Find the equation of the directrix line.

1 $x=5$

QUESTION 2. Consider the parabola $8(y+2)=(x-3)^2$.

(i) Roughly, sketch the curve.

2



$4d = 8$

$d = \frac{8}{4} = 2$

focus $= -2+2 = 0$

dl $= -2-2 = -4$

(ii) Find the focus

2 $(3,0)$

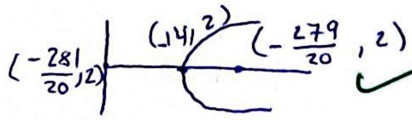
(iii) Find the equation of the directrix line.

1 $y=-4$

QUESTION 3. Consider $x=5y^2-20y+6$ ~~the parabola $-12(x-2)=(y-1)^2$.~~

(i) Roughly, sketch the curve.

1



(ii) write the equation of the form $4d(x-x_0)=(y-y_0)^2$

2

$x = 5y^2 - 20y + 6$

$x = 5((y^2-4y)+4-4)+6$

$x = 5(y-2)^2 - 20 + 6$

$x = 5(y-2)^2 - 14$

$x + 14 = 5(y-2)^2$

$\frac{1}{5}(x+14) = (y-2)^2$

$\rightarrow \frac{1}{5}(x+14) = (y-2)^2$

(iii) Find the focus

1 $\left(-\frac{279}{20}, 2\right)$

$4d = \frac{1}{5}$

$d = \frac{1}{5} \div \frac{4}{1} = \frac{1}{20}$

focus $= -14 + \frac{1}{20} = -\frac{279}{20}$

dline $= -14 - \frac{1}{20} = -\frac{281}{20}$

(iv) Find the equation of the directrix line.

1 $x = -\frac{281}{20}$

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Name Selma Ouenzar, ID 900095306

$\frac{15}{15}$

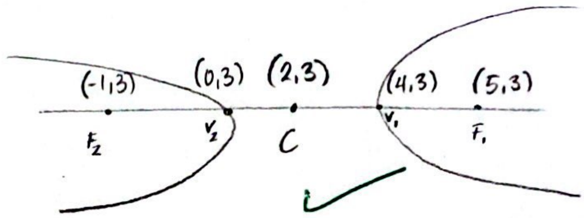
MTH 111, Quiz 3

Ayman Badawi

QUESTION 1. Given $\dfrac{(x-2)^2}{4} - \dfrac{(y-3)^2}{5} = 1.$

$\left(\frac{K}{2}\right)^2$ b^2

(i) Roughly, Sketch the curve.



2

$C = (2,3)$

(ii) Find the hyperbola-constant k.

2 $\left(\frac{K}{2}\right)^2 = 4 \quad \frac{K}{2} = 2 \quad \boxed{K = 4}$

(iii) Find the vertices.

2 $V_1 = (4,3)$
$V_2 = (0,3)$

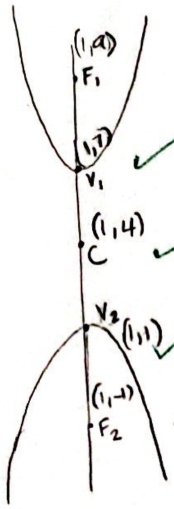
$|CF_1| = \sqrt{a^2+b^2} = \sqrt{4+5} = \sqrt{9} = 3$

(iv) Find the Foci.

2 $F_1 = (5,3)$
$F_2 = (-1,3)$

QUESTION 2. Given $\dfrac{(y-4)^2}{9} - \dfrac{(x-1)^2}{16} = 1.$

(i) Roughly, Sketch the curve.



2

$C = (1,4)$

(ii) Find the hyperbola-constant k.

1 $\left(\frac{K}{2}\right)^2 = 9 \quad \frac{K}{2} = 3 \quad \boxed{K = 6}$

(iii) Find the vertices.

2 $V_1 = (1,7)$
$V_2 = (1,1)$

(iv) Find the Foci.

2 $F_1 = (1,9)$
$F_2 = (1,-1)$

$|CF_1| = \sqrt{a^2+b^2} = \sqrt{9+16} = \sqrt{25} = 5$

Name ZAIN Al HAJJ , ID 45995

MTH 111, Quiz 4

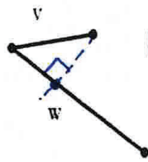
Ayman Badawi

$\frac{15}{15}$

QUESTION 1. Stare at this picture.

Draw Projection of W over V.

3/3



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3/3

QUESTION 2. Let $V = < 3, 2 >$ and $W = < 4, 1 >$.

a) Find the angle between V and W.

$$\cos\theta = \frac{V\cdot W}{|V|\cdot|W|} = \frac{12+2}{\sqrt{(3)^2+(2)^2} \times \sqrt{(4)^2+(1)^2}} = \frac{14}{\sqrt{13}\times\sqrt{17}}$$

$\frac{4}{4}$

$$\theta = \cos^{-1}\left(\frac{14}{\sqrt{13}\times\sqrt{17}}\right) \quad \boxed{\theta = 19.65^\circ}$$

b) Find the projection of V over W.

$$\frac{V\cdot W}{|W|^2}\cdot W$$

$$\frac{12+2}{\sqrt{(4)^2+(1)^2}^{\,2}}\cdot\langle 4,1\rangle \qquad \frac{14}{17}\cdot\langle 4,1\rangle \qquad \boxed{\left\langle \frac{56}{17}, \frac{14}{17}\right\rangle}$$

$\frac{5}{5}$

QUESTION 3. Find the parametric equations of the line that passes through $(1, 2, 3)$ and $(4, 3, 7)$.

Removed

b) Find the symmetric equation of the line above.

Name ZAIN AL HAJJ, ID 95995

MTH 111, Quiz 5

Ayman Badawi

15/15

QUESTION 1. A plane P passes through the points $(1,2,1),(2,2,3),(5,6,4)$. Find the equation of P.

$\overrightarrow{P_1P_2} : \langle 1,0,2\rangle$

$\overrightarrow{P_1P_3} : \langle 4,4,3\rangle$

I	J	K
1	0	2
4	4	3

$\left\langle \begin{vmatrix} 0 & 2 \\ 4 & 3 \end{vmatrix}, -\begin{vmatrix} 1 & 2 \\ 4 & 3 \end{vmatrix}, \begin{vmatrix} 1 & 0 \\ 4 & 4 \end{vmatrix} \right\rangle$

$-8(x-1)+5(y-2)+4(z-1)$

$x-1$
$y-2$
$z-1$

$= \langle -8,5,4\rangle$ 4/4

$\boxed{-8x+5y+4z=6}$ 3/3

7/7

QUESTION 2. The two planes $P_1 : 3x+2y+z=4$ and $P_2 : 6x-y+z=2$ intersect in a line L.

a) Find the parametric equations of L.

$P_1: 3x+2y+z=4$

$P_2: 6x-y+z=2$

$N_1: \langle 3,2,1\rangle$

$N_2: \langle 6,-1,1\rangle$

i	J	K
3	2	1
6	-1	1

$\left\langle \begin{vmatrix} 2 & 1 \\ -1 & 1 \end{vmatrix}, -\begin{vmatrix} 3 & 1 \\ 6 & 1 \end{vmatrix}, \begin{vmatrix} 3 & 2 \\ 6 & -1 \end{vmatrix} \right\rangle$

$\langle 3,3,-15\rangle$

$x=0$

$2y+z=4$

$-y+z=2$

$y = \dfrac{\begin{vmatrix} c & z \\ 4 & 1 \\ 2 & 1 \end{vmatrix}}{\begin{vmatrix} y & z \\ 2 & 1 \\ -1 & 1 \end{vmatrix}} = y = \frac{2}{3}$

$z = 2(\frac{2}{3}) + 4$

$z = \frac{8}{3}$

$(0, \frac{2}{3}, \frac{8}{3}) + t\langle 3,3,-15\rangle$

b) Find the symmetric equation of L.

PARAMETRIC: $x = 3t$
$y = 3t + \frac{2}{3}$
$z = -15t + \frac{8}{3}$

SYMMETRIC: $\frac{x}{3} = \frac{y-2/3}{3} = \frac{z-8/3}{-15}$

8/8

Name ZAIN AL HAJ, ID 95995

15/15

MTH 111, Quiz 6

Ayman Badawi

QUESTION 1. Find $f'(x)$ and do not simplify

(i) $f(x) = 6x^3 + 12x^2 - 5x + 2$

$f'(x) = \boxed{18x^2 + 24x - 5}$ 2

(ii) $f(x) = \frac{3}{x^2} + 7x^{-4} + 12$

$f'(x) = 3x^{-2} + 7x^{-4} + 12 = \boxed{-6x^{-3} - 28x^{-5}}$ 2

(iii) $f(x) = \frac{-9x^4 + 7x^2 - 13x}{x^5}$

$-9x^{-1} + 7x^{-3} - 13x^{-4}$

$f'(x) = \boxed{9x^{-2} - 21x^{-4} + 52x^{-5}}$ 2

QUESTION 2. Find the equation of the tangent line to the curve of $f(x) = 2x^4 - 7x^2 + 2$ when $x = 1$.

$y = mx + b$

$m = f'(1) = 2x^4 - 7x^2 + 2$

$8x^3 - 14x$

$8(1)^3 - 14(1) = -6$

$y = f(1)$

$2(1)^4 - 7(1)^2 + 2 = -3$

$-3 = -6(1) + b$

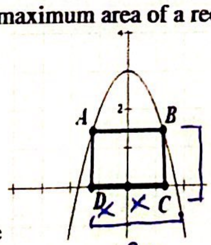
$b = 3$

$\boxed{Y = -6x + 3}$

5

QUESTION 3. What is the maximum area of a rectangle that we can draw above the x-axis and below the curve

of $f(x) = 3 - x^2$, see picture



4

$\overline{AB} = \overline{DC}$

$\overline{AD} = \overline{BC}$

length: $(3 - x^2)$

width: $2x$

$(2x)(3 - x^2)$

$= 6x - 2x^3$

$f'(x) = 6x - 2x^3$

$= 6 - 6x^2$

$6 - 6x^2 = 0$

$-6x^2 = -6$

$x^2 = 1$

$x = 1$

$l: 3 - (1)^2 = 2$

$w: 2(1) = 2$

$l \cdot w = 2 \cdot 2$

$= 4$

$\boxed{\text{Area: } 4 \text{ units}^2}$

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Name Jamila Ali , ID G00097411

$\frac{15}{15}$

MTH 111, Quiz 7

Ayman Badawi

QUESTION 1. Let $f(x) = x^3 - 6x^2 - 2x + 5$. Find all points on the curve of $f(x)$ that have a tangent line with slope 13

$f'(x) = 3x^2 - 12x - 2$

$3x^2 - 12x - 2 = 13$

$3x^2 - 12x - 2 - 13 = 0$

$3x^2 - 12x - 15 = 0$

6

$x_1 = 5$ $(5, -30)$

$x_2 = -1$ $(-1, 0)$

$f(5) = 5^3 - 6(5)^2 - 2(5) + 5$

$= -30$

$f(-1) = -1^3 - 6(-1)^2 - 2(-1) + 5$

$= 0$

QUESTION 2. Find y' and do not simplify

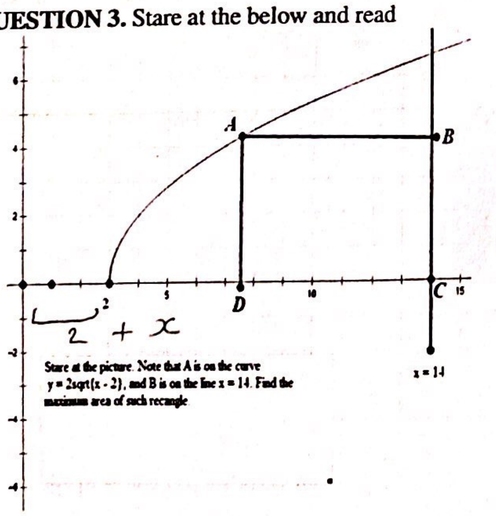
(i) $y = \sqrt[5]{x^3} + \frac{3}{x^4} + 13x^{-3} + 7$ $\quad x^{\frac{3}{5}} + 3x^{-4} + 13x^{-3} + 7$

$y' = \frac{3}{5}x^{-\frac{2}{5}} - 12x^{-5} - 39x^{-4}$ 2.5

(ii) $y = 2x^{3/2} + x^{-6/5} + 12\sqrt{x} - 10$ $\quad 2x^{\frac{3}{2}} + x^{-\frac{6}{5}} + 12x^{\frac{1}{2}} - 10$

$y' = 3x^{\frac{1}{2}} - \frac{6}{5}x^{-\frac{11}{5}} + 6x^{-\frac{1}{2}}$ 2.5

QUESTION 3. Stare at the below and read



Stare at the picture. Note that A is on the curve $y = 2sqrt(x - 2)$, and B is on the line $x = 14$. Find the maximum area of such recangle

$L = 2\sqrt{x-2} \rightarrow 2\sqrt{(2+x)} - 2 \rightarrow 2\sqrt{x}$

$w = 14 - (2+x) \rightarrow 12 - x$

4

$2\sqrt{x}\,(12 - x)$

$2x^{\frac{1}{2}}(12 - x)$

$A(x) = 24x^{\frac{1}{2}} - 2x^{\frac{3}{2}}$

$\boxed{A'(x) = 12x^{-\frac{1}{2}} - 3x^{\frac{1}{2}}}$

$\frac{3x^{\frac{1}{2}}}{1} \times \frac{12}{x^{\frac{1}{2}}}$

$\frac{3x}{3} = \frac{12}{3}$ $\boxed{x = 4}$

Check if its max

$A'' = -6x^{-\frac{3}{2}} - \frac{3}{2}x^{-\frac{1}{2}}$

$-6(4)^{-\frac{3}{2}} - \frac{3}{2}(4)^{-\frac{1}{2}}$

$-\frac{3}{2} = \text{max}$

max Area = $w = 12 - 4 = 8$, $L = 2\sqrt{4} = 4$ $\quad 8 \times 4 = 32$

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