

Name: \_\_\_\_\_

Grade: *Third year humanities*

Subject : *Mathematics*

*Al-Marj Official High School*

Date : / / 2013

Exam : *mid year*

Score : / 20

Q1) Consider the function  $f$  defined by  $f(x) = \frac{4x^2 - 3x + 3}{x - 1}$ .

Designate by (C) its representative curve in an orthonormal system (O;  $\vec{i}, \vec{j}$ ).

1) Write the domain of definition of  $f$ . (0.5pts)

2) Calculate  $\lim_{x \rightarrow 1} f(x)$  and  $\lim_{x \rightarrow 1} f(x)$  and deduce an asymptote (D) to (C). (1.5pts)

$x > 1$                        $x < 1$

3) a. Calculate  $\lim_{x \rightarrow +\infty} f(x)$  and  $\lim_{x \rightarrow -\infty} f(x)$ . (1pts)

b. Show that the straight line (d) of equation  $y = 4x + 1$  is an asymptote to (C). (1pts)

4) Verify that  $f'(x) = \frac{4x(x-2)}{(x-1)^2}$  and set up the table the variation of  $f$ . (3pts)

5) Draw (D), (d) and (C). (3pts)

6) Show that the point H(1;5) is a center of symmetry for (C). (2pts)

7) a. The straight line (d') of equation  $y = -5$  cuts (C) in two points A and B.  
Find the coordinates of A and B. (1pts)

b. Using (C), study according to the values of  $m$  the number of the roots of the equation  $f(x) = m$ . (1pts)

8) Without calculation, compare  $f(98)$  and  $f(99)$ . (1pts)

Q2) The table below shows the number of weekly study hours of

50 students of a class:

Number of hours	Frequency
[0 ; 5[	2
[5 ; 10[	8
[10 ; 15[	20
[15 ; 20[	10
[20 ; 25[	6
[25 ; 30]	4

1) Determine the modal class and find an estimation of the mode of this statistical distribution. (1pts)

2) Calculate the mean of this statistical data. (1pts)

3) a) Find the median class. (1pts)

b) Draw the increasing cumulative frequency polygon and calculate the median. (2pts)