3A & 3B Mathematics

Test 1 2009
50 marks
50 minutes + 2 minutes reading

Name_____

1. [2, 1, 2, 2 marks]

A winery produces a fine liquer which is predicted to increase in value by 4·8% p.a.

(a) How much will a bottle of liquer be worth in 2 years time, if it presently sells for $45?

(b) How much will a bottle of liquer be worth in n years time, if it presently sells for $45?

(c) The winemaker plans to release the liquer when it reaches a value of $100. How long will they have to wait for this to be the case?

(d) Another red wine produced by the winery is increasing in value at 2·3% p.a. If a large flagon presently sells for $74, how long will it be before the Liquer becomes more expensive than the flagon?

2. [2, 1, 2, 2 marks]

Given $p(x) = 5x + 3$ and $q(x) = 2 - x$, find the following:

(a) the point of intersection of the two lines,

(b) $p(4)$

(c) $p(q(-1))$

(d) the value of k for which $p(k) = -2$.

3. [1, 1, 3 marks]

A function has a defining rule $y = 2x^2$

Determine the defining rule for the new function if the graph of this function is

(i) moved 2 units left,

(ii) reflected in the y-axis,

(iii) reflected in the x-axis, then moved 3 units right and then 1 unit up.

4. [4 marks]

A cubic polynomial intersects the x-axis at $x = -2, 3, 5$.

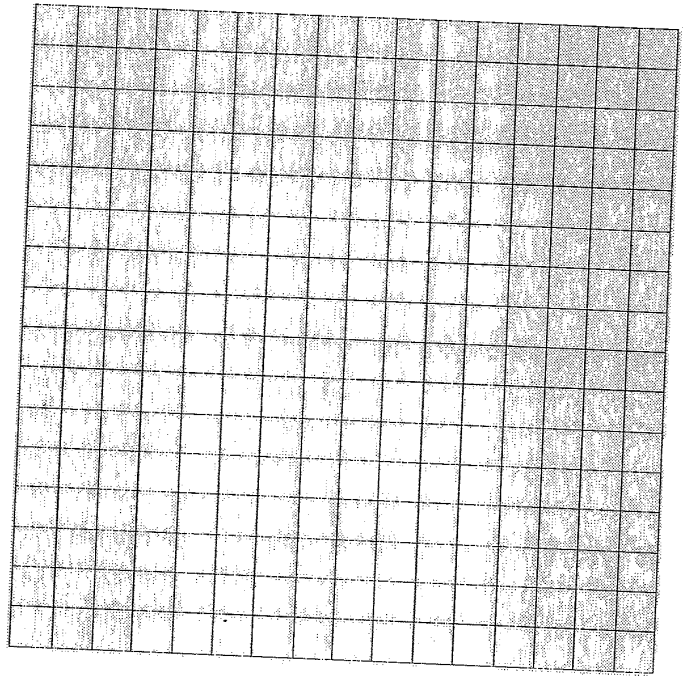
Given that the graph goes through the point (4, 2) find the equation for the polynomial in the form, $y = ax^3 + bx^2 + cx + d$.

5. [6 marks]

With the aid of a graphic calculator produce a sketch of

$$y = x^3 - 3x^2 + 4$$

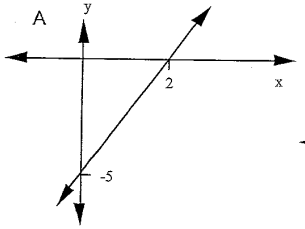
Indicate any turning points , intercepts with the axes and points of inflection. If any rounding is necessary give answers correct to 2 decimal places.



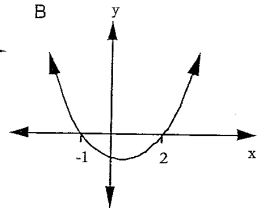
6. [2, 2, 2, 2, 2 marks]

Match each of the graphs below with its corresponding function.
Choose from the functions listed below, where a, b, c, d and e are positive integers:

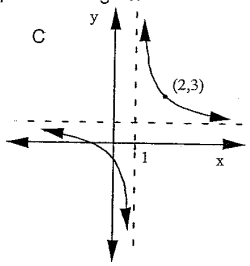
A



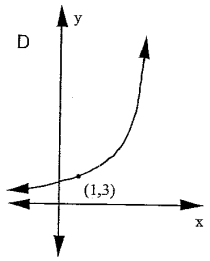
B



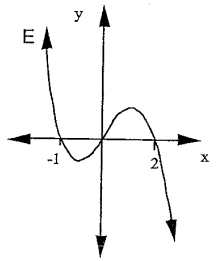
C



D



E



1. $y = ax - b$
2. $y = d^x + 1$
3. $y = -ax^3 + x^2 + dx$
4. $y = x^3 - ax - b$
5. $y = c^x - 1$
6. $y = \frac{1}{x+c}$
7. $y = x^2 + x - e$
8. $y = x^2 - x - d$
9. $y = \frac{1}{x-b} + a$
10. $y + ax = b$
11. $y = \frac{1}{x-a}$
12. $y = x + c$

7. [2, 3, 3 marks]

State the domain and range for the following functions:

(a) {(2, 3), (1, -9), (0, 4), (-3, 4), (-2, 5), (6, 1)}

(b) $y = x^2 + 4x + 3$

(c) $y = \frac{1}{2x-3} + 1$

8. [3 marks]

Given the graphs for $f(x) = ax^3 + bx^2 + cx + d$ and $g(x) = ex^2 + fx + g$,
for real constants a, b, ...,g, solve to 1 decimal place, the equation $f(x) = g(x)$.