

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 $x = -2, 3, 5$.

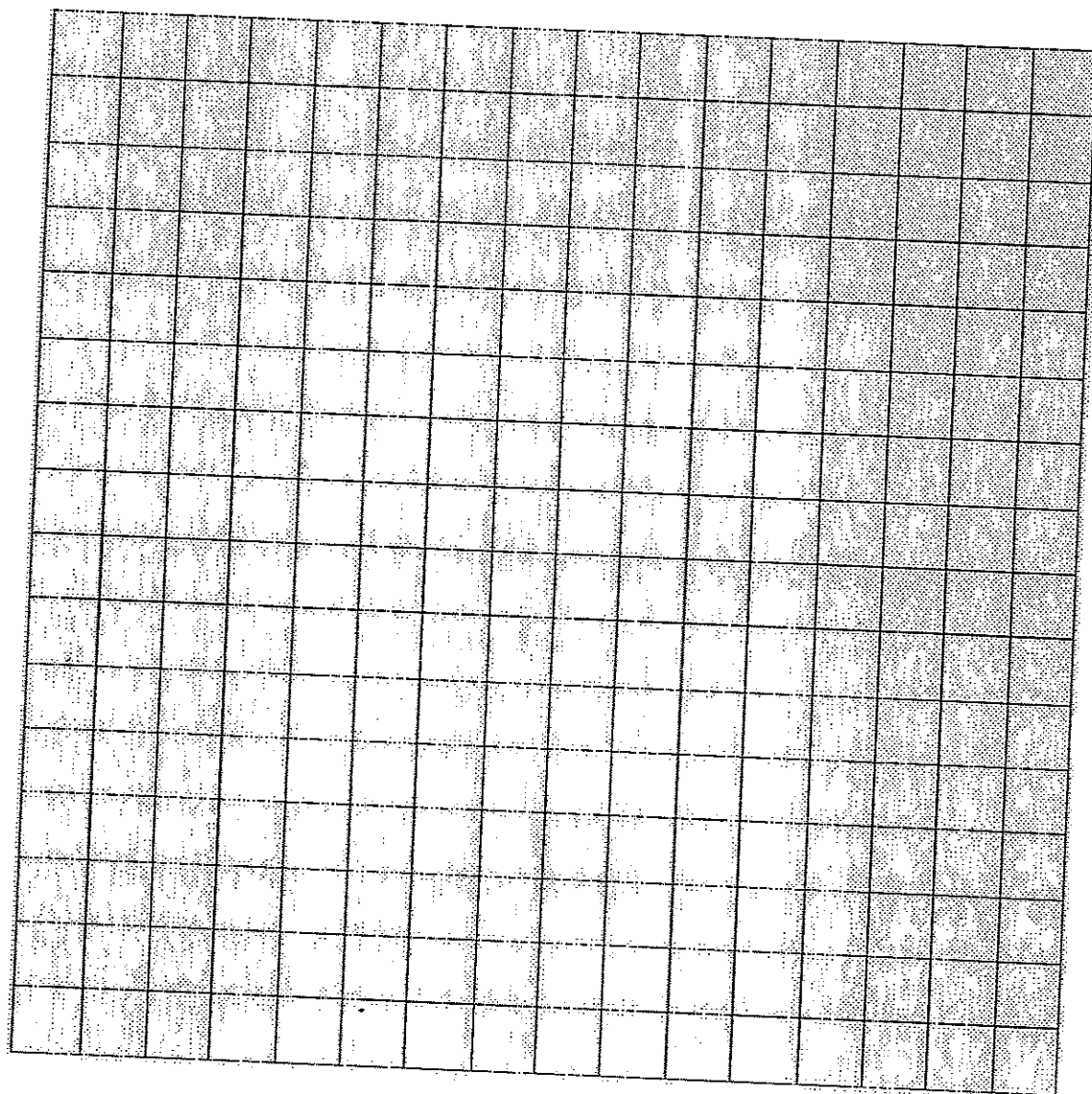
Given that the graph goes through the point $(4, 2)$ find the equation for the polynomial in the form, $y = ax^3 + bx^2 + cx + d$.

5. [6 marks]

With the aid of a graphic calculator produce a sketch of

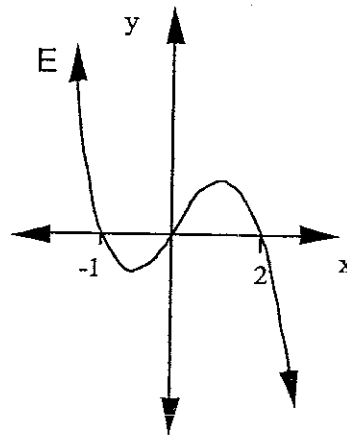
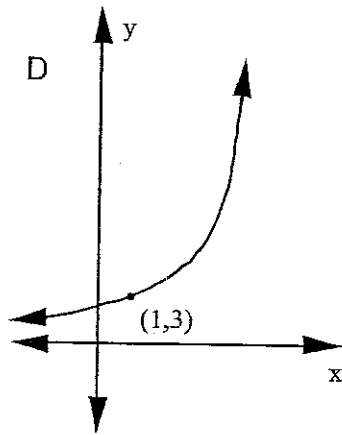
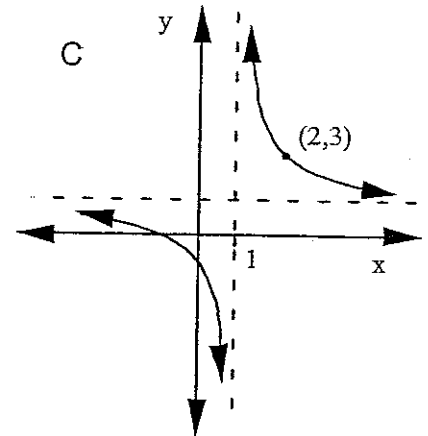
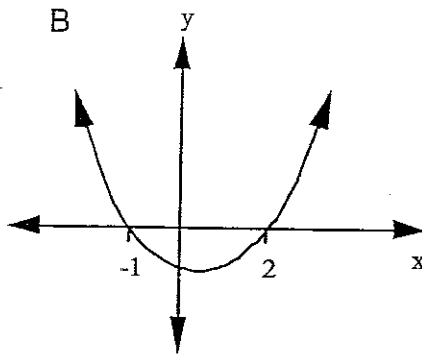
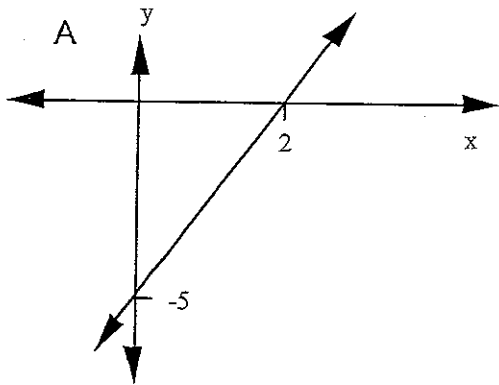
$$y = x^3 - 3x^2 + 4$$

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:



- | | | |
|-----------------------|-------------------------|----------------------------|
| 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, \dots, g , solve to 1 decimal place, the equation $f(x) = g(x)$.

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are needed to see this picture.

