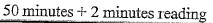
#### 3A & 3B Mathematics

# Test 1 2009







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

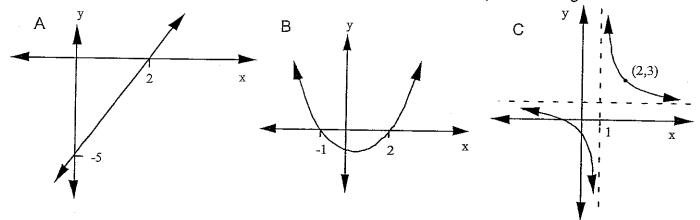
$$y = x^3 - 3x^2 + 4$$

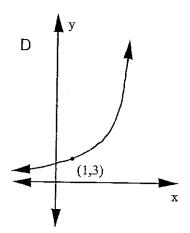
Indicate any turning points, intercepts with the axes and points of inflection. If any rounding is necessary give answers correct to 2 decimal places.

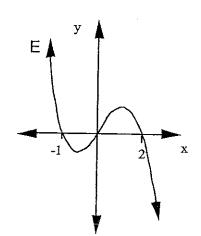
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#### 6.. [2, 2, 2, 2, 2 marks]

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.  $y = c^{x} - 1$ 

$$y = c^{X} - 1$$

6. 
$$y = \frac{1}{x+c}$$

7. 
$$y = x^2 + x - e$$

$$y = x^2 + x - e^x + 8$$
.  $y = x^2 - x - d$ 

9. 
$$y = \frac{1}{x-b} + a$$

10. 
$$y + ax = b$$

4

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).

QuickTime™ and a decompressor are needed to see this picture

