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|  | **YEAR 12 MATHEMATICS SPECIALIST**  **SEMESTER ONE 2016**  **TEST 2: Functions** |

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

Friday 1st April

**Time: 50 minutes Mark /45 = %**

* Answer all questions neatly in the spaces provided. **Show all working.**
* You are permitted to use the Formula Sheet in **both** sections of the test.
* You are permitted one A4 page (one side) of notes in the calculator assumed section.

**Calculator free section Suggested time: 30 minutes /28**

1. [11 marks]

Two functions *f* and *g* are defined by  and 

* 1. Evaluate 

[2]

* 1. What is the range of  when ?

[1]

* 1. What is the natural domain of 

[2]

* 1. Predict the domain and range for 

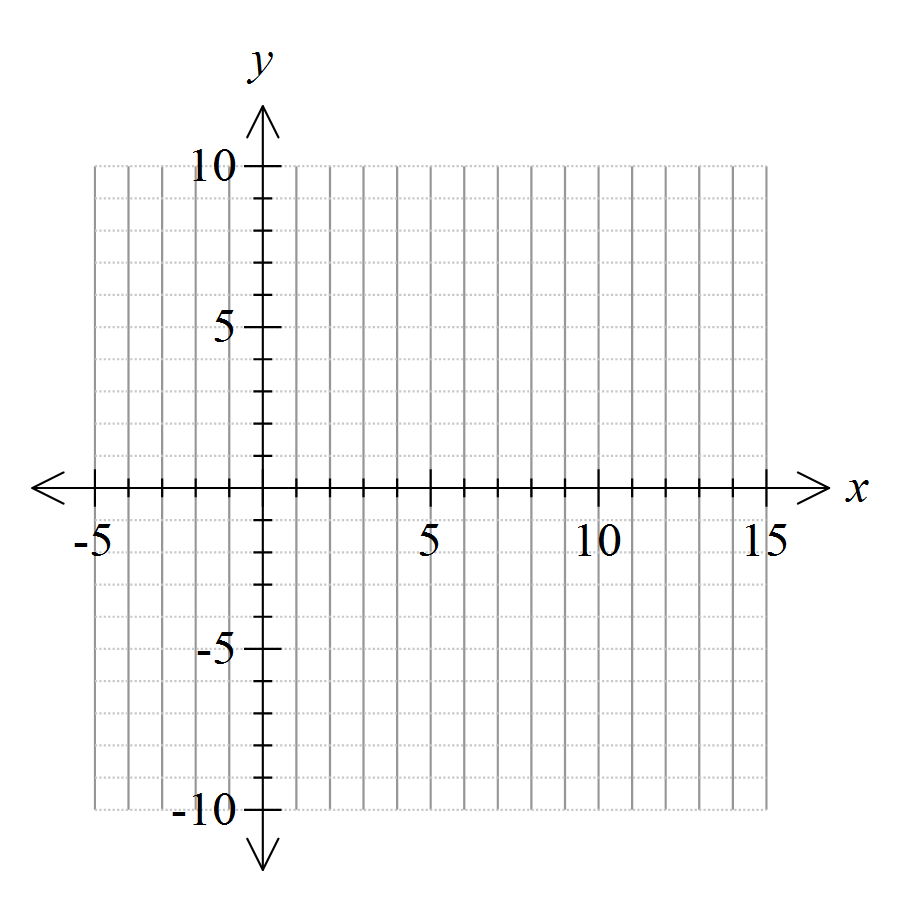
[2]

* 1. Determine , including all domain restrictions

[2]

Turn over for the last part of question 1

* 1. Sketch  and clearly indicate the range of this composite function. [2]



1. [17 marks]

Consider the rational function 

* 1. Identify and classify all points of discontinuity

[4]

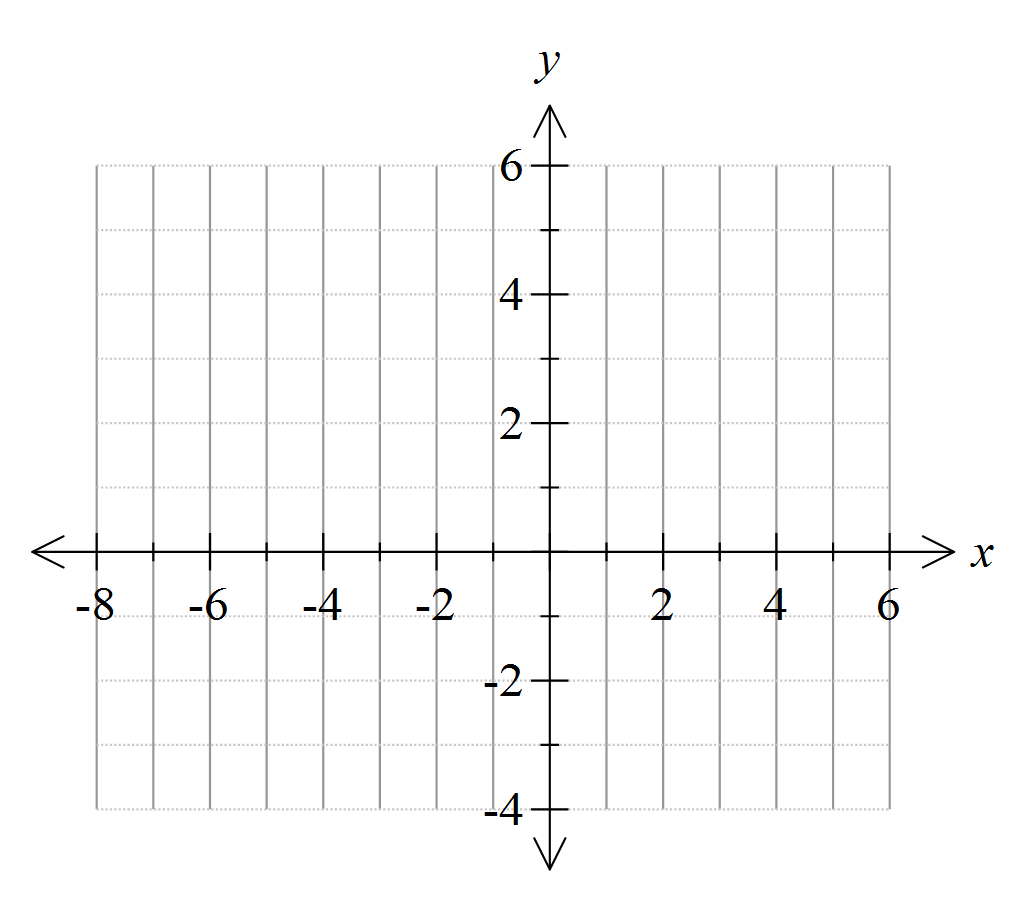
* 1. List the asymptotes (horizontal and vertical)

[2]

* 1. Determine all intercepts

[2]

* 1. Sketch  [3]



* 1. Does  possess an inverse function ? How do you know?

[2]

* 1. Show algebraically that  and identify appropriate restrictions on the domain and range.  
     Use a simplified expression for  in your calculations.

[4]

**Calculator assumed section Suggested time: 20 minutes /17**

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

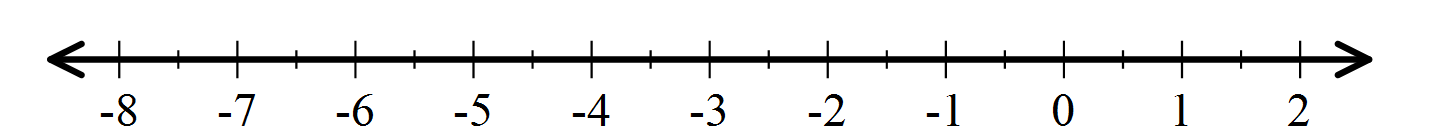
1. [5 marks]

Mark solutions to these equations on the number lines provided.

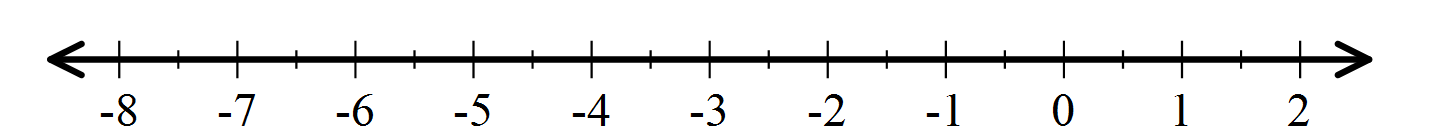
In (b), clearly explain clearly how to use distance considerations in determining the solution.

* 1. 

[1]

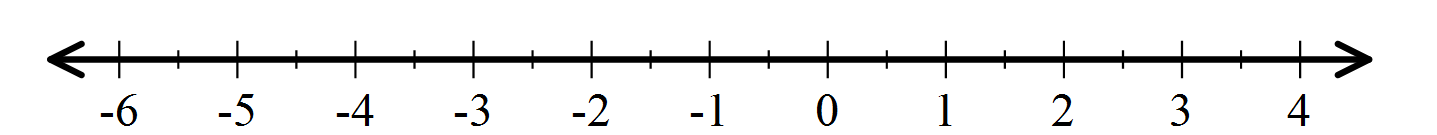


* 1. 



[3]

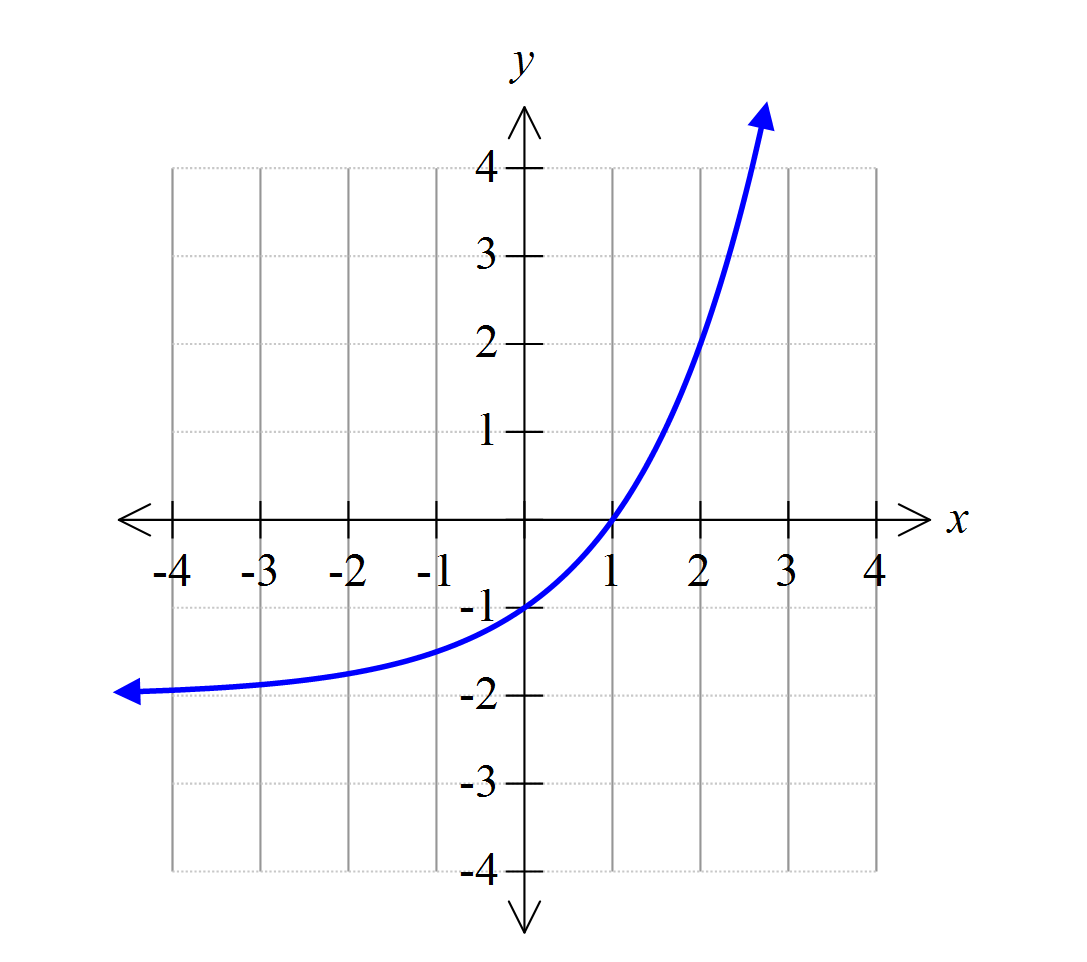
* 1. 



[1]

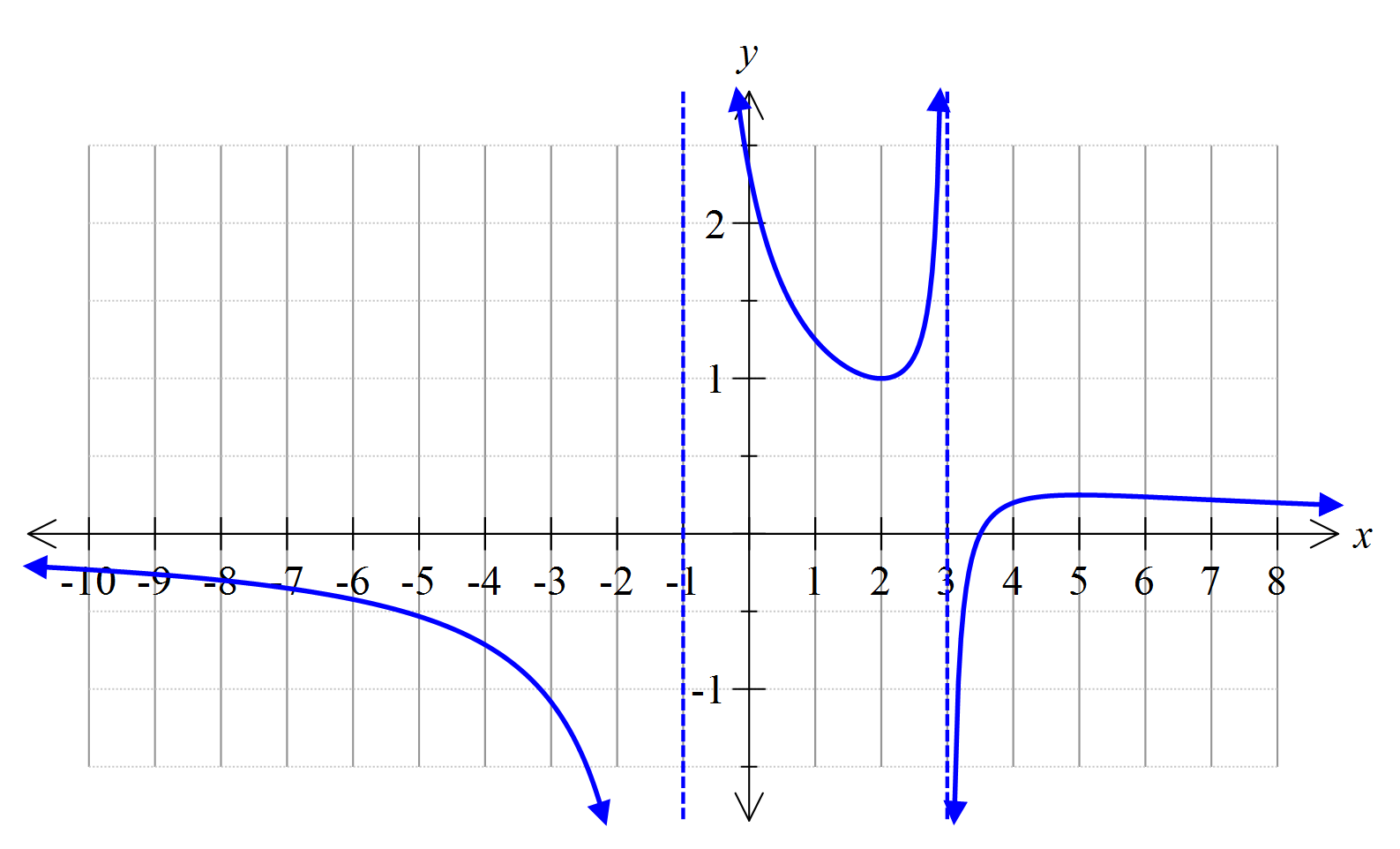
1. [5 marks]

The graph of  is shown. Add the graphs of  and .



1. [7 marks]

This graph represents a function of the form 



The vertical asymptotes are as shown, the *x*-intercept is (3.5, 0) and one turning point is at.

* + - * 1. Determine the values of the constants *a*, *b*, *c* and *d*.

[5]

* + - * 1. What is the range of ?

[2]