

Name \_\_\_\_\_ Date \_\_\_\_\_

**Part A: Multiple choice (choose the best response)**

- Find the coefficient of the 18<sup>th</sup> term in the expansion of  $(r + s)^{25}$ .  
 a)  $\frac{25!}{18!7!}$       b)  $\frac{25!}{17!8!}$       c)  $\frac{25!}{16!9!}$       d)  $\frac{25!}{10!}$
  - Which of the following is equivalent to  ${}_{60}C_{10}$ ?  
 a)  ${}_{60}C_{50}$       b)  ${}_{60}C_{20}$       c)  ${}_{600}C_{100}$       d)  ${}_6C_1$
  - If the 7<sup>th</sup> term in the expansion of the binomial  $(2x - y)^n$  is  $768768x^8y^6$ . What is the value of  $n$ ?  
 a)  $n = 7$       b)  $n = 14$       c)  $n = 15$       d)  $n = 48$
  - How many permutations can we make with the letters of the word: ENSEIGNANTE  
 a)  $11!$       b)  $\frac{11!}{3!3!}$       c)  $\frac{11!}{6!}$       d)  $\frac{11!}{3!3!5!}$
  - Completely simplify:  $\frac{(n-1)!}{(n-4)!}$   
 a)  $\frac{1}{(n-2)(n-3)(n-4)}$       b)  $(n-1)(n-2)(n-3)$       c)  $(n-2)(n-3)$       d)  $(n-1)$
- For the questions 6 to 8, use the following functions:  $f(x) = \sqrt{x-3}$  and  $g(x) = x-1$**
- Find the domain of the function  $f(g(x))$ .  
 a)  $x \in R$       b)  $x \geq 3$       c)  $x \geq 2$       d)  $x \geq 4$
  - Find the range of the function  $g(f(x))$ .  
 a)  $y \in R$       b)  $y \geq 0$       c)  $y \geq -1$       d)  $y \geq 3$
  - Find the equation of the function  $g(g(x))$ .  
 a)  $g(g(x)) = x - 2$       b)  $g(g(x)) = (x - 1)^2$       c)  $g(g(x)) = x$       d)  $g(g(x)) = 2x - 2$

**Part B: Short Answer (non-calculator)**

1. How many terms will there be in the expansion of the binomial  $(3x^2 - 1)^7$ ?

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2. How many arrangements of the letters ABCDEF can be made if AB and CD must be together. Leave your answer in factorial form.

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3. Solve the following equation:  $\frac{(n-4)!}{(n-5)!} = 6$

$n =$  \_\_\_\_\_

4. Marble Slab offers 3 different types of ice cream, 2 types of cones and 5 types of toppings. If we must chose one of each, how many different types of ice cream cones can we create?

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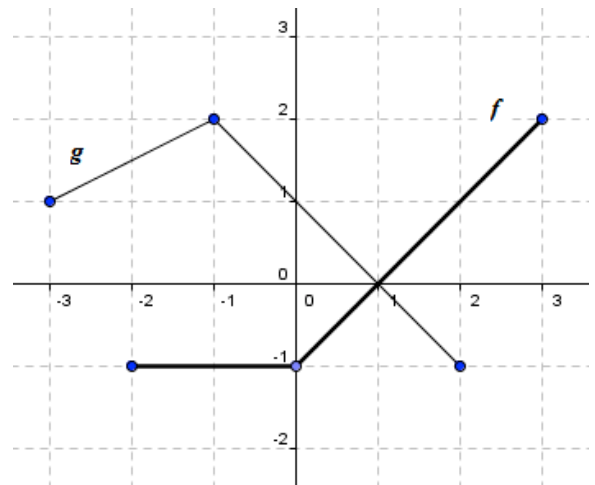
5. Find the first term in the expansion of  $(3x^2 - 2)^{12}$ ? It is not necessary to simplify this term.

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Use the following graph to evaluate the following expressions:

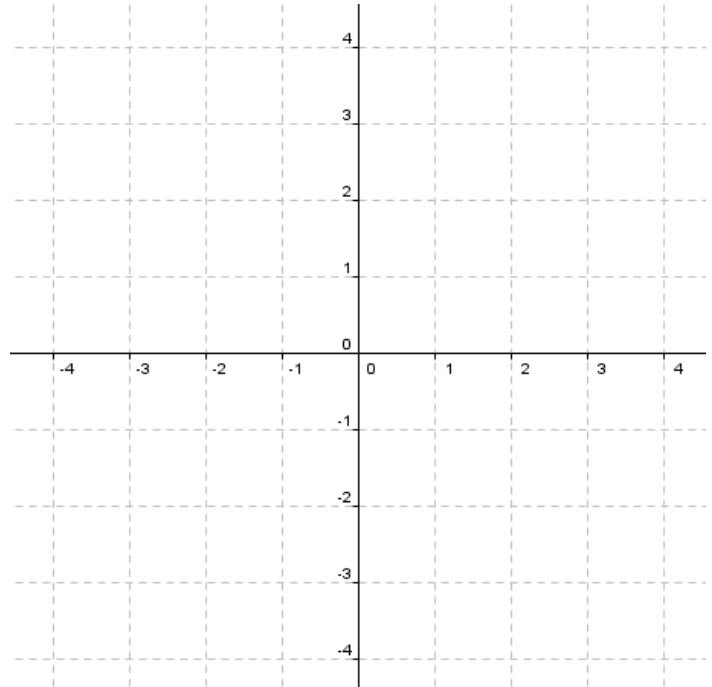
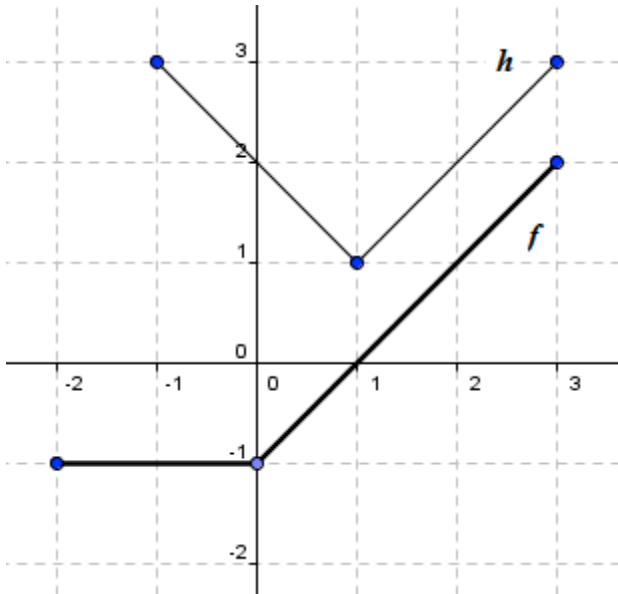
6.  $f(f(1))$

7.  $(g - f)(0)$



**Part C : Long answer (NO CALCULATOR)**

1. Given the following graphs, sketch the graph of  $g(x)$  if  $h(x) = f(x) - g(x)$ .  
(Hint : A table of values might help)



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2. How many numbers of 4 positions can we make if the number must be larger than 5370 and if we can only use the numbers 2, 3, 4, 5, 7 and 8 without repetition?

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3. Solve algebraically:  ${}_nP_2 = 110$

/3

4. If  $f(x) = x^2 - 1$  and  $g(x) = x + 1$ ;

a) Find the equation of a simplified equation of the function  $h(x) = \frac{f(x)}{g(x)}$ .

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b) Find the domain of  $h(x)$ .

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**Part D: Long answer (WITH CALCULATOR)**

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

5. Find the simplified term that contains  $x^{23}$  in the expansion of the binomial  $\left(\frac{x}{2} - 3x^4\right)^8$  ?

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6. There are 5 girls and 4 boys. We must make a group of 5 people.

a) How many different groups of 5 people can we make?

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b) How many different groups are possible if there must be at least 3 girls in the group?

/2

c) Irena and Serena are 2 of the 5 girls. If we chose one of these girls we must chose the other. Note that you do not have to pick either of these girls. How many different groups can we make?

/2