

Show all work and justify all answers or credit might not be awarded.

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1. Find the (implied) domain of the function given by  $F(x) = \frac{1}{\sqrt{7-2x}}$ .

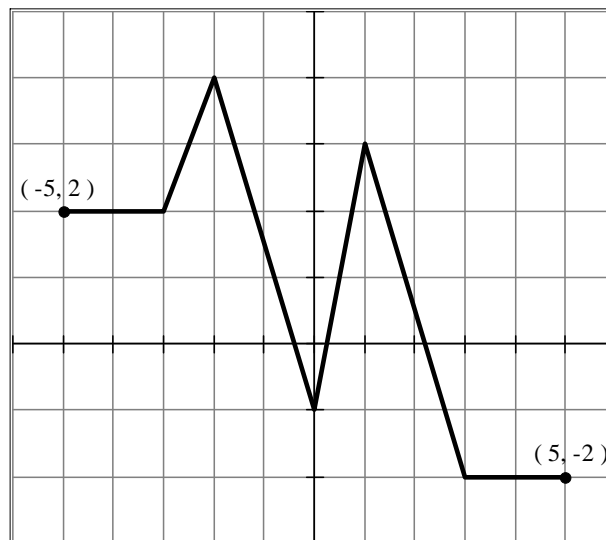
Answer: \_\_\_\_\_

2. Given the function  $p(x) = 3x^2 - x + 1$ , evaluate and simplify each of the following expressions.

a.  $p(-1) =$

b.  $p(x+1) =$

3. The graph of a function  $f$  consists of straight line segments as indicated below. Use the graph to determine all intervals on which  $f$  is increasing.



Answer: \_\_\_\_\_

4. Find a formula for the function that is finally graphed after all three of the following transformations are applied to the graph of  $y = \sqrt{x}$ .
- (1) Shift up 3 units
  - (2) Shift right 2 units
  - (3) Reflect about the  $x$ -axis
5. Let  $f(x) = x^2 - 1$  and  $g(x) = 2x + 3$ . Compute and simplify  $f(g(x))$  and  $g(f(x))$  by writing each as a quadratic function in standard form.

$$f(g(x)) = \underline{\hspace{4cm}}$$

$$g(f(x)) = \underline{\hspace{4cm}}$$

6. A farmer has 2000 feet of fencing available for enclosing rectangular plot of land. What is the largest area of land that can possibly be enclosed with this fencing?

Answer: The maximum area is                      square feet.

7. Form a polynomial  $p(x)$  of degree 3 that has the following zeros:  $x = -1$ ,  $x = 2$ , and  $x = a$  (assume  $a$  does not equal  $-1$  or  $2$ ).

Answer:  $p(x) = \underline{\hspace{4cm}}$

8. Find the (implied) domain of the rational function  $r(x) = \frac{3(x^2 - 1)}{4(x^2 + 2x - 3)}$ .

Answer: \_\_\_\_\_

9. What is the (implied) domain of the function  $q(x) = \sqrt{\frac{x+3}{4-x}}$ .

Answer: \_\_\_\_\_

10. Find all the real zeros of the polynomial function  $P(x) = 3x^3 - 8x^2 - 17x + 22$  given that  $x = 1$  is a zero of  $P$ .

Answer: \_\_\_\_\_

11. Write the complex number  $\frac{3-i}{2+i}$  in the standard form  $a + bi$ .

Answer: \_\_\_\_\_

12. Find all real and all complex zeros of the polynomial  $h(x) = 3x^3 - x^2 + 27x - 9$ .

Answer: \_\_\_\_\_

13. Find a formula for the function that is the inverse of  $f(x) = \frac{x-3}{2x+5}$  (domain all real numbers except  $-5/2$ ).

Answer:  $f^{-1}(x) =$  \_\_\_\_\_.

14. Determine the range of the function  $f(x) = 4 - e^{-x}$  assuming the domain is all real

numbers.

Range = \_\_\_\_\_

15. Find all real solutions of the equation  $\log_2(x^2 - 8) = 3$ .

Answer: \_\_\_\_\_

16. Write the following expression as the logarithm of a single quantity:  
 $y = 5 \log_2 u - \log_2(u + 4)$ .

Answer:  $y = \log_2 \left( \underline{\hspace{2cm}} \right)$

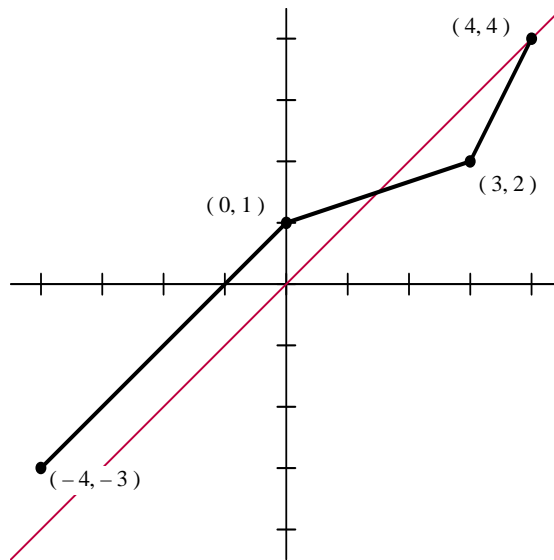
17. Use the Change-of-Base Formula and a calculator to approximate  $\log_4 13$ . Round your answer to three decimal places.

Answer: \_\_\_\_\_

18. Suppose that \$500 is invested at 4% compounded quarterly. Find the resulting amount (to the nearest cent) after 6 years.

Answer: \_\_\_\_\_

19. The graph of a one-to-one function is given below, along with the graph of the line  $y = x$ . On the same set of axes, draw the graph of the inverse function.



20. Find  $g(-2)$  given that  $g(x) = \begin{cases} |x + 3| & \text{if } x \leq 0 \\ 3^x & \text{if } x > 0 \end{cases}$ .

Answer: \_\_\_\_\_