

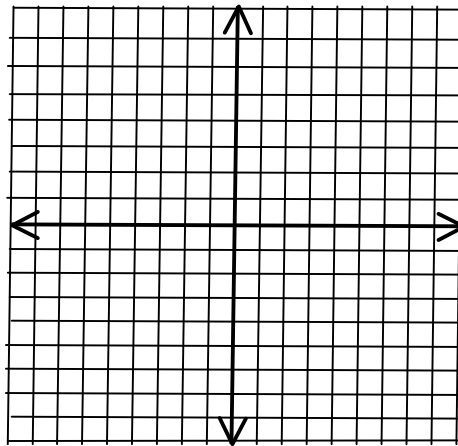
1. Describe the sequence of transformations of $g(x) = x^2$ which results in the function $f(x) = -(x+3)^2 - 20$.

2. Given: $g(x) = \begin{cases} x^2 - 4 & \text{if } x \leq 0 \\ x + 2 & \text{if } x > 0 \end{cases}$.

a) $g(-1) =$ _____

b) $g(0) =$ _____

- c) Draw a reasonable sketch of $g(x)$.



3. Find the intervals where $P(x) = -x^2 - 4x + 2$ is increasing or decreasing. Identify any relative maximum and minimum points.

Increasing Interval(s) _____ Decreasing Interval(s) _____

Relative Maximum Point(s) = _____ Relative Minimum Point(s) = _____

4. Given $g(x) = 5^x$, find

a) $g^{-1}(x) =$ _____

b) the domain of $g(x)$ in interval notation. _____

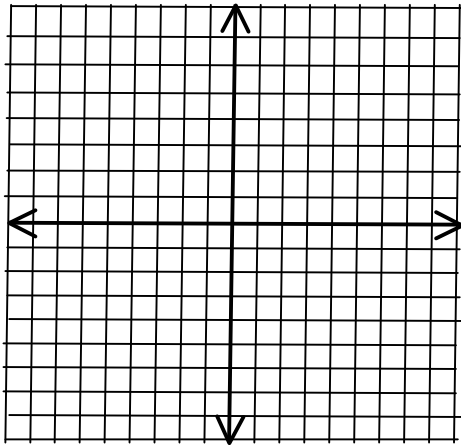
c) the domain of $g^{-1}(x)$ in interval notation. _____

5. Given: $f(x) = x + 1$ and $g(x) = x^2 + 6$. Find and simplify all answers:

a) Find the composition of the functions $g(f(x)) =$

b) $(f \cdot g)(x)$

6. Graph the function $f(x) = x^2 + 2x - 3$. Find the vertex, axis of symmetry the x -intercepts and the y -intercept.



Vertex: _____

Equation of the axis of symmetry: _____

x -intercepts: _____

y -intercept: _____

7. Use long or synthetic division to divide $(x^3 - 6x^2 + 2x - 4) \div (x - 2)$.

8. Write the complex number $3 + \sqrt{-36}$ in standard form $(a + bi)$.

9. Perform the operation and write the result in standard form $(a + bi)$.

$$\frac{2 - 4i}{3 + i}$$

10. Find all zeros of $f(x) = x^3 - 7x + 6$ and write the polynomial as a product of linear factors.

zeros: _____

factors: _____

11. Find the domain, intercepts and any vertical and horizontal asymptotes of $f(x) = \frac{x^2 - 2x - 15}{2x^2 - 8}$.

Domain: _____ x -intercept(s): _____

y -intercept: _____

equation(s) of vertical asymptote(s): _____

equation(s) of horizontal asymptote(s): _____

12. Solve $x^2 - x \leq 6$ for x . Your answer must be in interval notation.

13. Solve $2(3)^x = 8$ for x . Round your result to three decimal places.

$x =$ _____

14. Find the domain, x -intercept and vertical asymptote of $f(x) = \ln(x + 2)$.

domain = _____

x -intercept = _____

equation(s) of vertical asymptote(s): _____

15. Use the properties of logarithms to expand $\ln\left(\frac{x}{x^2 - 9}\right)^4$ as a sum, difference, and/or constant multiple of logarithms.

16. Solve the following system. Express your answer(s) in the form (x, y) .

$$y = x^3$$

$$y = 3x^2 + 10x$$

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17. Explain in words, without using your calculator, why $\log_3 243 = 5$. Do not use the word "logarithm" in your explanation.

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18. The population P of a culture of bacteria is described by the equation $P = 1000e^{0.042t}$, where t is the time, in hours, relative to the time at which the population was 1000.

a) What is the population at $t = 6$ hours?

b) After how many hours will the population reach 10,000? Round to the nearest tenth of an hour.