Unit 1A Assignment

Work slowly and carefully. If you are having difficulty, go back and review the appropriate *Lesson*.

As your midterm and final exams do not allow calculators, it is best to attempt all questions in this *Assignment* without a calculator.

Be sure to proofread your assignment carefully.

For full marks, show all calculations, steps, and/or explain your answers.

Total: 100 marks.

(2) 1. Write $\{x \mid x \leq 2, x \in \mathrm{R}\}$ in interval notation, and draw the inequality on a number line.

(2) 2. Express $(-1, 4]$ in set builder notation. Graph the set on a number line.

(2) 3. Find the domain and range of $f(x) = \dfrac{\sqrt{x+5}}{x-1}$. Write the solution in set builder notation.

4. Given $f(x) = x + 4$ and $g(x) = 2x + 8$, determine the following. Simplify all answers.

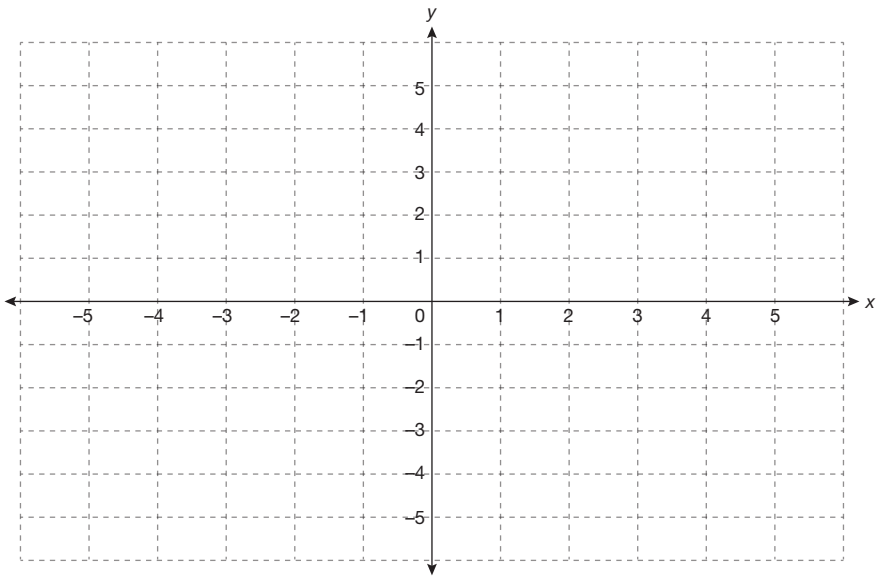
(1) a. $(f+g)(x)$

(1) b. $(fg)(x)$

(2) c. $\left(\frac{f}{g}\right)(x)$

(2) d. $\left(\frac{g}{f}\right)(x)$

(4) 5. Simplify and sketch the graph of $\left(\frac{f}{g}\right)(x)$ given $f(x) = x^2 + 5x + 6$ and $g(x) = x + 2$.



6. Given $f(x) = 4x - 1$, $g(x) = \sqrt{x}$, and $h(x) = (x + 2)^3$, simplify each of the following functions and state any variable restrictions.

(2) a. $(f \circ g)(x)$

(2) b. $(g \circ h)(x)$

(2) c. $f(g(h(x)))$

(2) d. $g(g(x))$

7. Given $f(x) = 3x - 1$ and $g(x) = x^3$ evaluate the following functions.

(2) a. $(g \circ f)(1)$

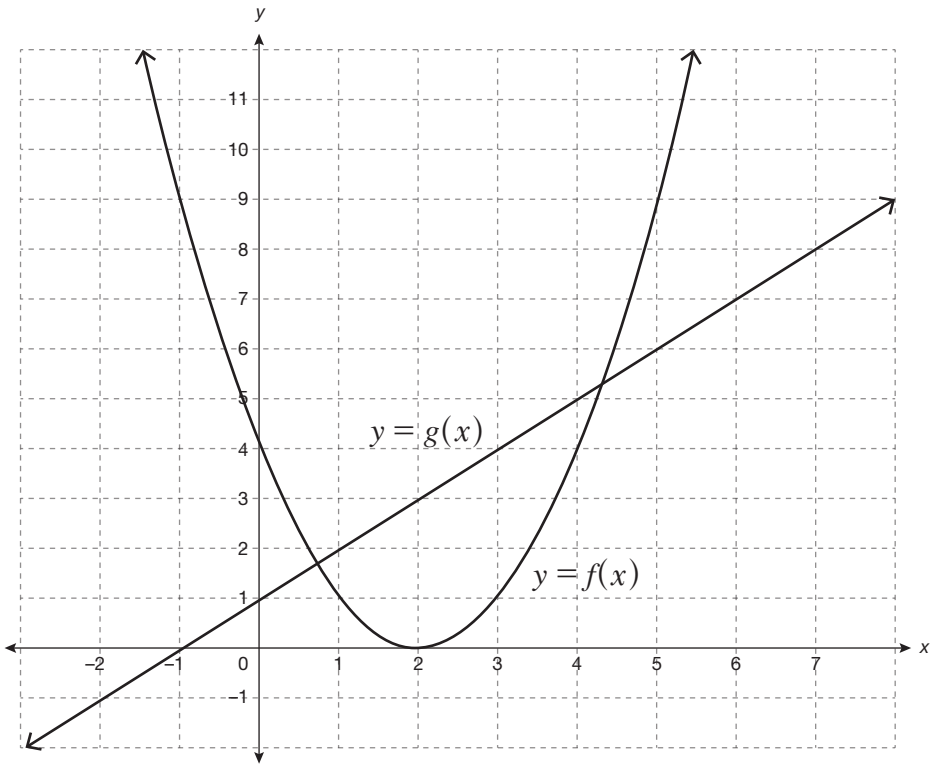
(2) b. $(fg)(2)$

(2) c. $\left(\frac{f}{g}\right)(3)$

(2) d. $\left(\frac{g}{f}\right)(1)$

(2) 8. Given $f(x) = x^2$ and $g(x) = x - 1$ find x such that $f(g(x)) = g(f(x))$.

9. Use the given graphs of $y = f(x)$ and $y = g(x)$ to evaluate each function.



(2) a. $(f \circ g)(2)$

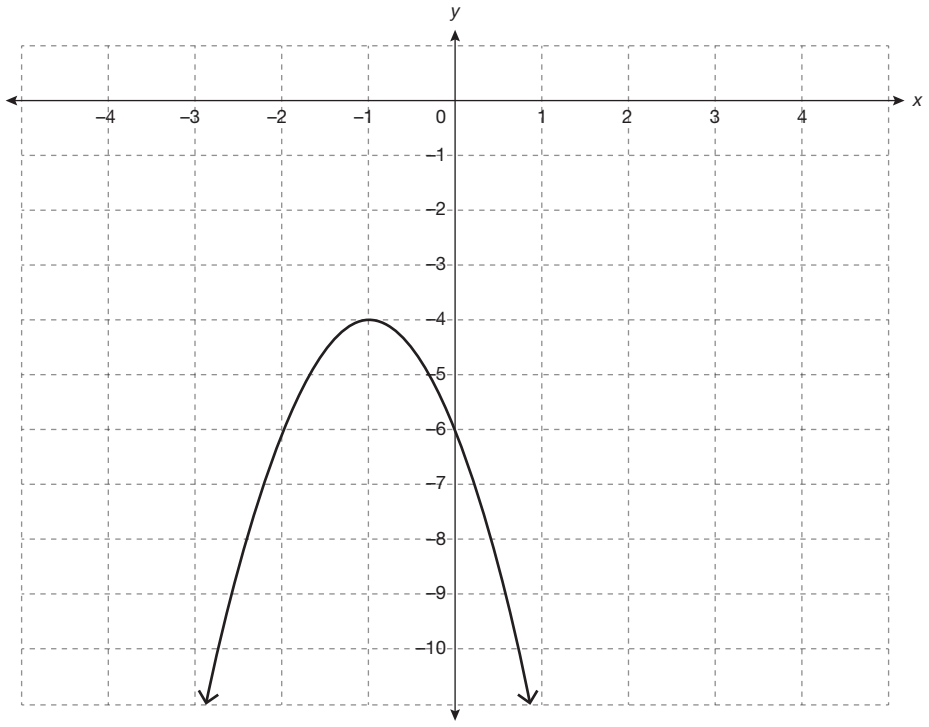
(2) b. $(g \circ f)(2)$

(2) c. $(f \circ f)(1)$

(2) d. $(g + f)(2)$

(3) 10. Determine the domain of $y = g(f(x))$, given $f(x) = \sqrt{1 - x}$ and $g(x) = \sqrt{3 - x}$.

(3) 11. The function $f(x) = x^2$ has been transformed as shown on the graph. Describe the transformations, and state the equation of the transformed graph below.



(1) 12. The vertex of $f(x) = |x|$ is $(0, 0)$ and the vertex of $g(x) = -4|(5(x-3))| + 7$ is (h, k). Determine the value of h.

(2) 13. Fill in the blanks.

The function $f(x) = \sqrt{x}$ has been transformed into the function $g(x) = -2\sqrt{3x-12} + 5$.

Express the transformed function in the form $g(x) = a\sqrt{b(x-h)} + k$ and complete the following statement.

$g(x) =$ _____

The function $y = f(x)$ has been transformed in the function $y = g(x)$ by stretching

the graph _____ by a factor of _____, stretching the graph

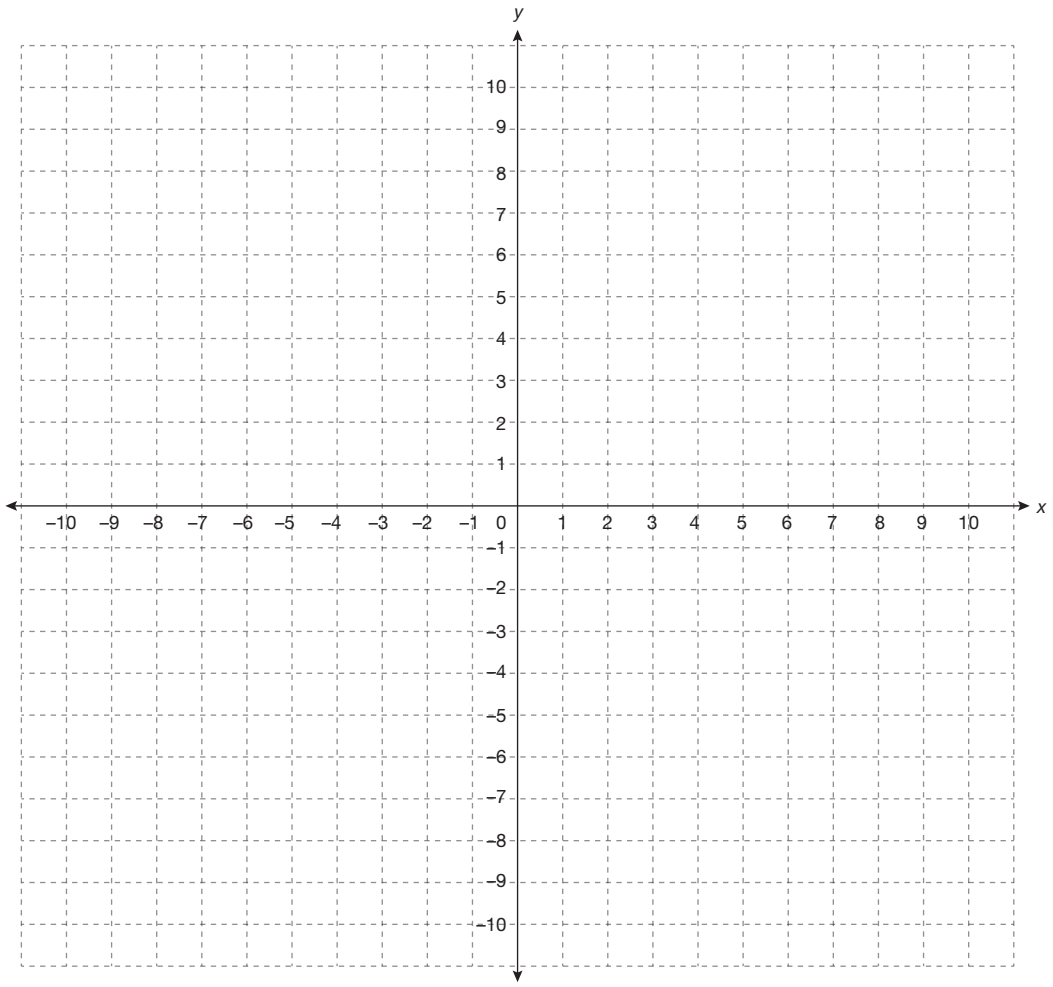
_____ by a factor of _____, reflecting in the _____,

translating _____ units to the _____, and translating

_____ units _____.

(4) 14. Graph the system of equations and state the solution.

$$2x + y - 3 = 0$$
$$4x - y + 9 = 0$$



15. Solve the following systems of equations algebraically.

(3) a. $x - 2y + 2 = 0$
$3x + 2y + 2 = 0$

(3) b. $4x - y = 11$
$x - 2y = -13$

(3) 16. Ashley has been paying attention to the number of calories she burns while exercising. One day, she spent three hours hiking and two hours golfing. She calculated she burned $1\,770$ calories. The next day, she hiked for four hours and golfed for four hours. She calculated that she burned $2\,800$ calories. How many calories per hour does Ashley burn doing each exercise?

17. Simplify each expression. Identify any non-permissible values.

(3) a. $\frac{x^2 - 2x}{x + 1} \cdot \frac{x^2 - 1}{x^2 + x - 6}$

(3) b. $\frac{2x^2 + x - 1}{2x^2 + 5x - 3} \div \frac{x^2 + 2x + 1}{x + 3}$

(3) c. $\dfrac{x}{x^2-3x-4}-\dfrac{4}{x+1}$

(3) d. $\dfrac{3x+1}{2x^2-2}+\dfrac{2x+2}{2x^2-8x+6}$

(4) 18. Solve the inequality $|2 + 4x| > 6$ and graph the solution on a number line.

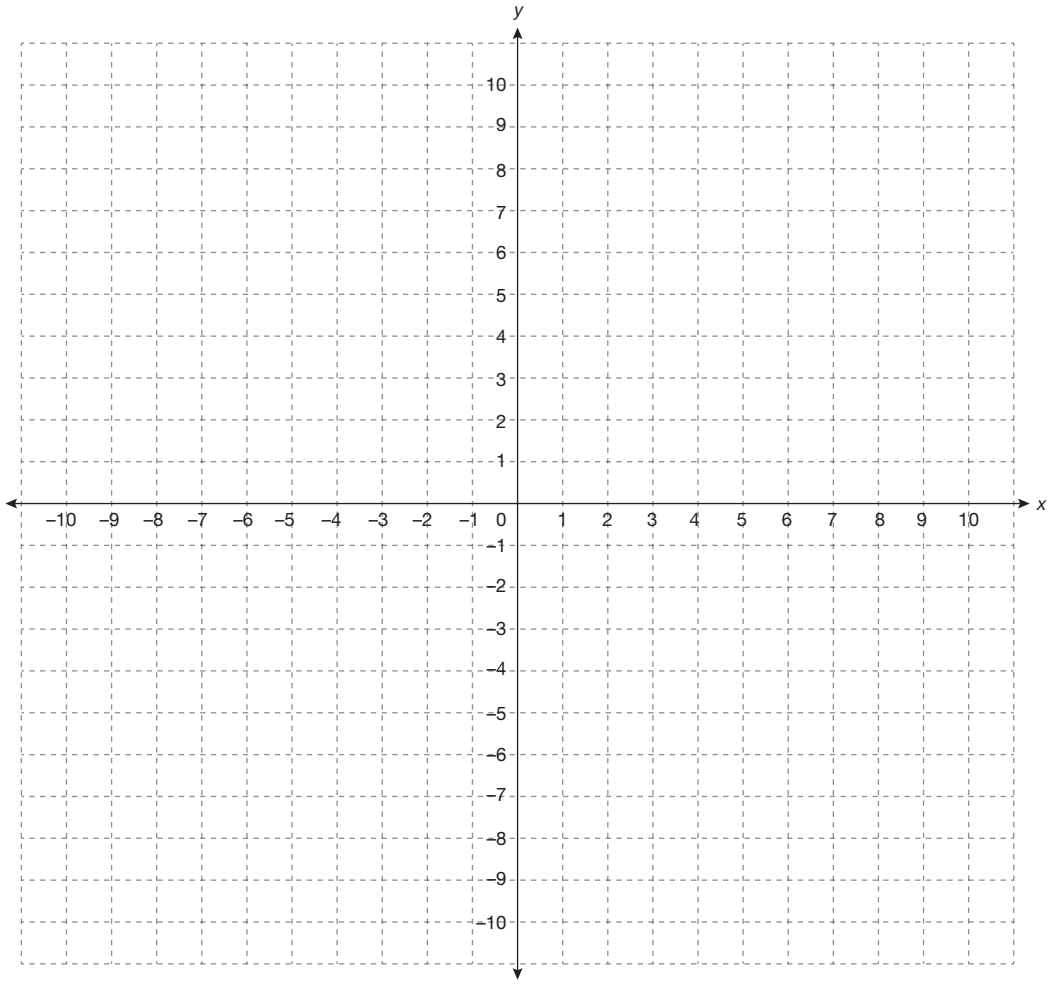
Express the solution in interval notation.

(4) 19. Solve the inequality $\frac{2x}{x+1} < -2$ by first expressing it in the form $\frac{P(x)}{Q(x)} < 0$.

Express the solution in set builder notation.

(6) 20. Solve the inequality $\frac{|x+3|}{|2x|} > 1$ and graph the solution on a number line.

(3) 21. Graphically determine the solution to the inequality $x^2 - x - 6 \leq 0$.



(4) 22. Solve $-x^2 + 7x - 10 < 0$ algebraically. Write the solution using set builder notation.

(3) 23. Solve $2x^2 - 5x \geq 3$ using sign analysis. Show the analysis and write the solution using interval notation.