

Math 1513 - College Algebra

Final Exam - 2018.12.12

Name: _____

1. Find the equation of the line passing through the points $(1, 2)$ and $(-1, 4)$. Express your answer in *both* slope-intercept and point-slope form.

2. Perform the complex multiplication $(1 + 2i)(2 - 5i)$, express your answer in standard complex form $a + bi$.

3. Perform the complex multiplication $\frac{1 + 2i}{2 - 5i}$, express your answer in standard complex form $a + bi$.

4. Solve for x in the following equation: $x = 3 + \sqrt{23 - x}$.

5. Solving the following inequality, express your answer in interval notation. $1 < |2x + 3| \leq 4$

6. Factor the following polynomial completely: $p(x) = x^7 + x^6 - x^5 - x^4 - x^3 - x^2 + x + 1$.

7. Sketch the graph of $q(x) = x^2(x-1)^2(x+1)(x+2)^3$. Be sure to take into account end behaviour, multiplicity of each root, and degree of the polynomial, while graphing.

8. Sketch the graph of $r(x) = \frac{3(x+3)(x-1)}{(x+1)(x-2)}$. Be sure to explicitly state the domain, list any vertical/horizontal/slant asymptotes, and roots. Make sure these appear on your graph.

9. Solve $\frac{4(x+1)(x-1)^2}{(x+2)(x-2)} \geq 0$, express your answer in interval notation.

10. Compute the domain of $t(x) = \sqrt{\frac{2x+1}{x-1}}$.

11. Sketch the graph of $y = 2|3x - 1| + 1$, starting with the graph of $y = |x|$ and applying translations, scalings, and reflections.

12. If $f(x) = \sqrt{3x - 2}$ and $g(x) = \frac{1}{x}$, then

(a) compute the domain of $f(x)$

(b) compute the domain of $g(x)$

(c) compute the domain of $(f + g)(x)$

(d) compute the domain of $(g \circ f)(x)$

(e) evaluate $(f \circ g)(1)$

(f) evaluate $(g \circ f)(9)$

13. Solve for w : $-\frac{3}{4}\log_3(16w^4) + \frac{2}{3}\log_3(8w^3) = 2$.

14. Solve the following system of linear equations:

$$\begin{cases} 2x - y - 3z &= 2, \\ x + y + z &= -1, \\ -x + 2y - z &= -8 \end{cases}$$

15. Solve the following system of linear inequalities by graphing the solution region. *Be sure to clearly define your region.*

$$\begin{cases} x + y & \leq 1, \\ x - y & \leq 1, \\ -x + y & \leq 1, \\ -x - y & \leq 1 \end{cases}$$

16. Sketch the graph of the following piecewise function:

$$P(x) = \begin{cases} -1, & -3 < x < -1, \\ x, & -1 \leq x < 1, \\ 1, & 1 < x \leq 4 \end{cases}$$

17. Solve the following system of nonlinear equations:

$$\begin{cases} x^2 + y^2 = 34, \\ x^2 - 2y^2 = 7 \end{cases}$$

18. The following is the graph of an invertible function (solid line). On the same graph, sketch the inverse function. The line $y = x$ (dotted line) has been included on the graph to aid you in your sketch.

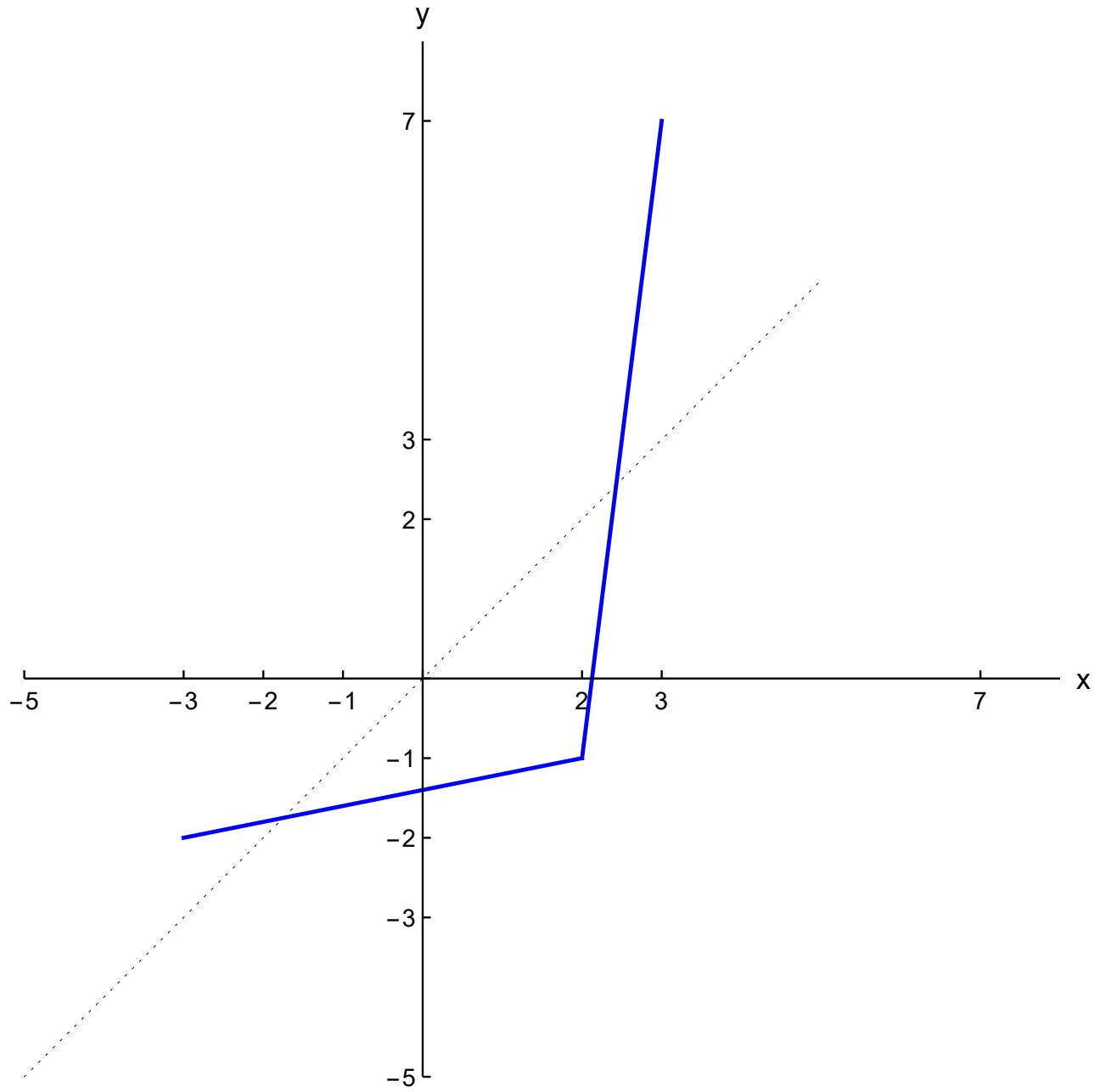


FIGURE 1. Graph of the invertible function $f(x)$.