MAC1105 Exam 3 Review

* For questions that ask for a graph, ask your instructor to see the worked out solutions.

1. a) $\{-\frac{2}{3}, 2\}$ b) $\{-2, 2\}$ c) no solution d) $\{-3, \frac{3}{5}\}$
2. a) $[-4, 8]$ b) $(-\infty, -2) \cup (6, \infty)$ c) $(-\infty, \infty)$
   d) $(-\infty, -1] \cup \frac{3}{2}, \infty)$ e) $(-\infty, -2) \cup (0, 5)$
3. a) $(-\infty, -4] \cup [3, \infty)$ b) $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$
4. $2\sqrt{5}$
5. $(x-3)^2 + (y+2)^2 = 5$
6. $y = -\frac{2}{3}x + 3$
7. $y = -\frac{7}{3}x + \frac{2}{3}$
8. a) undefined slope; graph is a vertical line through $x = -2$ b) slope 0 and equation $y = -1$
9. slope-intercept: $y = 2x + 8$, standard: $2x - y = -8$
10. a) center: $(-1, 0)$, radius: 4 b) $x = -1$
11. $k = -2$
12. intercepts: $(3, 0)$, $(-3, 0)$, $(0, 3)$, $(0, -3)$, symmetry: even, odd, no it's not a function
13. both a and b
14. a) $(-1, -3)$ b) $(1, -3)$ c) $(1, 3)$
15. a) infinitely many solutions b) one solution
16. a) no b) yes, domain: {-4,3,4,5,6}, range: {-2,-1,0}
17. a, d, and e
18. a) 5 b) 0 c) $a^2 - 12a + 32$ d) $(0, 5)$, $(5, 0)$, $(1, 0)$
19. a) neither, domain: $(-\infty, \infty)$, range: $(-\infty, \infty)$, increasing: none, decreasing: $(-\infty, \infty)$

    b) neither, domain: $(-\infty, \infty)$, range: $(-\infty, 0]$, increasing: $(-\infty, -1)$, decreasing: $(-1, \infty)$

    c) odd, domain: $(-\infty, 0) \cup (0, \infty)$, range: $(-\infty, 0) \cup (0, \infty)$, increasing: none, decreasing: $(-\infty, 0) \cup (0, \infty)$

    d) even, domain: $(-\infty, \infty)$, range: $[-9, \infty)$, increasing: $(0, \infty)$, decreasing: $(-\infty, 0)$

20. $(-2, 5)$ is on the graph of f, $(5, -2)$ is on the graph of f^{-1}

21. a) $f(-3) = 3$, $f(0) = -1$, $f(1) = -1$, $f(3) = -3$
    b) increasing: $(-6, -3)$, decreasing: $(-3, -1)$, $(1, \infty)$, constant: $(-1, 1)$
    c) domain: $[-6, \infty)$, range: $(-\infty, 3]$ d) max value: 3, occurs at $x = -3$

22. a) $f(-2) = 4$, $f(2) = 0$, $f(4) = 4$ b) $(0, 2)$ d) domain: $(-\infty, \infty)$, range: $[0, \infty)$

23. a) Not one-to-one b) One-to-one c) One-to-one

24. Note: Problem should read $g \circ f(x) = \sqrt[4]{x^2 + 3x + 4}$. $f(x) = x^2 + 3x + 4, g(x) = \sqrt[4]{x}$

25. $f \circ g = \dfrac{4 + x}{x}$, domain: $(0, \infty)$; $g \circ f = \sqrt{\frac{4}{x^2} + 1}$, domain: $(-\infty, 0) \cup (0, \infty)$

26. $f + g = \dfrac{x^2 - 2}{x(x - 1)}$, domain: $(-\infty, 0) \cup (0, 1) \cup (1, \infty)$

    $\dfrac{f}{g} = \dfrac{2(x - 1)}{x(x - 2)}$, domain: $(-\infty, 0) \cup (0, 1) \cup (1, 2) \cup (2, \infty)$

27. a) $f^{-1}(x) = \frac{4 - 2x}{x}$ b) $g^{-1}(x) = 4 - x^3$.

28. they are inverse functions

29. domain of f: $[1, \infty)$, range of f: $[0, \infty)$, domain of f^{-1}: $[0, \infty)$, range of f^{-1}: $[1, \infty)$, $f^{-1}(x) = x^2 + 1$, $x \geq 0$