Section numbers appear in [ ] next to each question.
NO = No Calculator

Show all your work. Erase or cross out anything you don’t want graded. Clearly identify your answer.

[1.3] Perform the indicated operations. Simplify the answer.
1) \( \frac{\sqrt{-8} \cdot \sqrt{-4}}{\sqrt{2}} \)

[1.3] Perform the indicated operation. Write the result in standard form.
2) \((-4 - 9i) - (-2 + 7i) + (5 - 2i)\)

[1.3] Find the product. Write the answer in standard form.
3) \(i(4 - 3i)(9 - 3i)\)

[1.3] Find the quotient. Write the answer in standard form.
4) \(\frac{5 - 6i}{8 + 2i}\)

[1.4] Solve the equation or inequality.
5) \(x^2 - 19 = 0\)

[1.4] Solve the equation by the zero-factor property.
6) \(x^2 + 10x - 24 = 0\)
7) \(15x^2 + 26x + 8 = 0\)

[1.4] Use the square root property to solve the equation.
8) \((7x + 7)^2 = 25\)

[1.4] Solve by completing the square.
9) \(x^2 + 4x + 13 = 0\)
10) \(2x^2 + 7x + 3 = 0\)

[1.4] Solve the equation using the quadratic formula.
11) \(3x^2 + 12x + 2 = 0\)
12) \(\frac{4}{9}x^2 - \frac{4}{3}x = -1\)

[1.5] Solve the problem.
13) A ladder is resting against a wall. The top of the ladder touches the wall at a height of 9 ft. Find the length of the ladder if the length is 3 ft more than its distance from the wall.

[1.6] Solve the equation.
14) \(\frac{24}{x - 2} + \frac{24}{x + 2} = 5\)
15) \(\sqrt{2x + 15} - x = 6\)
16) \(\sqrt{x + 4} = 6\)
17) \(x^4 + 1125 = 134x^2\)
18) \((4x - 2)^2 - 4(4x - 2) + 3 = 0\)
19) \(40x^{-2} + 39x^{-1} = 40\)

[1.7] Solve and graph the inequality. Give answer in interval notation.
20) \(6x - 6 \geq 7x - 15\)

[1.7] Solve the quadratic inequality. Write the solution set in interval notation.
21) \(x^2 + 8x + 7 \geq 0\)

[1.7] Solve the rational inequality. Write the solution set in interval notation.
22) \(\frac{x + 16}{x + 5} < 9\)

[1.8] Solve the equation.
23) \(|6x - 5| = 5\)
[1.8] Solve the equation.
24) \(|5x + 3| + 6 = 10

[1.8] Solve the equation.
25) \(|5x - 8| = 16x - 5|

[1.8] Solve the inequality. Write the solution set in interval notation.
26) \(|6x + 5| < 19

[1.8] Solve the inequality. Write the solution set in interval notation.
27) \(|x - 5| + 4 > 3

[1.8] Solve.
28) \(|x + 1| \leq 0

[2.1] Find the distance between the pair of points.
29) (-4, 5) (-6, -7)

[2.1] Find the midpoint of the line segment joining the two points.
30) \(\left(\frac{3}{2}, \frac{7}{2}\right)\) and \(\left(\frac{11}{2}, \frac{-3}{2}\right)\)

[2.1] Given an endpoint of a line segment and its midpoint, find the other endpoint.
31) If (10, 6) is the endpoint of a line segment, and (12, 2) is its midpoint, find the other endpoint.

[2.2] Use the graph to determine the equation of the circle in center-radius form.
32)

[2.2] Find the center-radius form of the equation of a circle.
33) center (-1, -9), radius 5

[2.2] Find the center and radius of the circle.
34) \(x^2 + y^2 + 14x - 10y + 49 = 0\)

[2.3] Give the domain and range of the relation.
35) \(y = \sqrt{4 + x}\)

36) \(y = \frac{7}{15 - x}\)

[2.3] Decide whether the relation defines a function.
38)

39) \(y = \frac{3}{x - 5}\)

40) \(y^2 = 2x\)
[2.3] Solve the problem.

41) Find \( f(-2) \) when \( f(x) = x^2 - 3x + 5 \)

42) Find \( g(a - 1) \) when \( g(x) = \frac{1}{5}x + 3 \).

[2.3] Determine the intervals over which the function is decreasing, increasing, and constant.

43) [Diagram of a graph]

[2.5] Write an equation for the line described. Give your answer in standard form.

44) through \((2, 5)\), undefined slope

[2.5] Write an equation for the line described. Give your answer in slope-intercept form.

45) \( m = \frac{8}{5}, \ b = -3 \)

46) perpendicular to \( 7x + 4y = 69 \), through \((7, -5)\);

[2.5] Find the slope and the \( y \)-intercept of the line.

47) \( 6x - 8y = 8 \)

[2.6] Determine the intervals of the domain over which the function is continuous.

48) [Graph with point \((4, 0)\)]

49) [2.6] Fill in the blanks and graph the function.

[Diagram of a graph]

Function Name: Cubing Function

Equation: _____________

50) [2.6] Fill in the blanks.

[Diagram of a graph]

Function Name: _____________

Equation: _____________
[2.6] Graph the function.

51) \( f(x) = \begin{cases} 
4x^2, & \text{if } x \leq -1 \\
4, & \text{if } -1 < x < 1 \\
4x + 1, & \text{if } x \geq 1 
\end{cases} \)

[2.6] Find the requested value.

52) \( f(5) \) for \( f(x) = \begin{cases} 
7x + 5, & \text{if } x \leq 0 \\
7 - 4x, & \text{if } 0 < x < 4 \\
x, & \text{if } x \geq 4 
\end{cases} \)

[2.7 NC] Determine whether the equation has a graph that is symmetric with respect to the y-axis, the x-axis, the origin, or none of these.

53) \( x^2 - y^2 = 4 \)

[2.7 NC] Determine if the function is even, odd, or neither.

54) \( f(x) = -6x^3 + 5x \)

55) \( f(x) = 3x^3 - 2x^2 - 4 \)

[2.7] Find the function.

56) Find the function that is finally graphed after the following transformations are applied to the graph of \( y = 1 \times 1 \). The graph is shifted right 3 units, stretched by a factor of 5, shifted vertically down 2 units, and finally reflected across the x-axis.

[2.7 NC] Graph the function.

57) \( f(x) = -(x + 5)^2 - 5 \)

58) \( g(x) = -\sqrt{x + 1} - 2 \)

[2.8] Evaluate.

59) Find \( \left( \frac{f}{g} \right)(-2) \) when \( f(x) = 4x - 7 \) and \( g(x) = 4x^2 + 14x + 2 \).

[2.8] For the pair of functions, find the indicated sum, difference, product, or quotient.

60) \( f(x) = 4x - 2 \), \( g(x) = 2x - 8 \)

Find \( (f - g)(x) \).

[2.8] Find the specified domain.

61) Find the domain of \((f + g)(x)\) when \( f(x) = \sqrt{7x - 4} \) and \( g(x) = \frac{1}{x} \).

[2.8] Find the requested function value.

62) Find \((g \circ f)(9)\) when \( f(x) = 3x - 7 \) and \( g(x) = -6x^2 + 7x + 9 \).
[2.8] For the given functions \( f \) and \( g \), find the indicated composition.
63) \( f(x) = \frac{x - 7}{8} \), \( g(x) = 8x + 7 \)
\((g \circ f)(x)\)

[3.1] Find the domain and range of the function.
64) \( f(x) = (x + 2)^2 + 7 \)

[3.1] Sketch the graph of the parabola.
65) \( y = 3(x - 4)^2 - 6 \)

[3.1] Graph. Identify the vertex.
66) \( y = -3x^2 - 2x - 7 \)

[3.2] Use synthetic division to decide whether the given number \( k \) is a zero of the given polynomial function.
69) \( \frac{1}{2}; f(x) = 2x^4 - 21x^3 + 3x + 1 \)

[3.3] Use the factor theorem to decide whether or not the second polynomial is a factor of the first.
70) \( 9x^4 + 37x^3 - 4x^2 + x + 4; x + 4 \)

[3.3] Factor \( f(x) \) into linear factors given that \( k \) is a zero of \( f(x) \).
71) \( f(x) = x^3 - 4x^2 - 49x + 196; k = 7 \)

[3.3] Find all rational zeros and factor \( f(x) \).
72) \( f(x) = x^3 - 6x^2 + 3x + 10 \)
73) \( f(x) = 4x^3 - 28x^2 - x + 7 \)

[3.3] Find the zeros of the polynomial function and state the multiplicity of each.
74) \( f(x) = 3(x + 8)^2(x - 8)^3 \)

[3.4] Solve the problem.
75) The graph of \( f(x) \) is shown below. Use the graph to factor \( f(x) \).

[3.2] Use synthetic division to perform the division.
67) \( \frac{x^5 + 7x^4 + 7x^3 - 12x^2 + 13x - 9}{x + 5} \)

[3.2] Use the remainder theorem and synthetic division to find \( f(k) \).
68) \( k = -3; f(x) = -x^3 - 2x^2 + 3 \)
[3.4 NC] Sketch the graph of the polynomial function.
76) \( f(x) = (x + 4)^4 + 5 \)

[3.4 NC] Graph the polynomial function. Factor first if the expression is not in factored form.
77) \( f(x) = -3x^2(x + 2)(x + 1) \)

[3.5 NC] Graph the function.
80) \( f(x) = \frac{3}{x + 3} \)

[3.5] Give the domain and range for the rational function. Use interval notation.
81) \( f(x) = \frac{9}{x} + 10 \)

[3.5 NC] Answer the question
82) How can the graph of \( f(x) = \frac{1}{(x - 3)^2} + 2 \) be obtained from the graph of \( y = \frac{1}{x^2} \)?

[4.1] Determine whether or not the function is one-to-one.
83) \( f(x) = \sqrt{25 - x^2} \)

[4.1 NC] Decide whether or not the functions are inverses of each other.
84) \( f(x) = 2x + 4, \ g(x) = \frac{1}{2}x - 2 \)

[4.1] If \( f \) is one-to-one, find an equation for its inverse.
85) \( f(x) = \sqrt{x + 9}, \ x \geq -9 \)

[4.2] Find the function value. If the result is irrational, round your answer to the nearest thousandth.
86) Let \( f(x) = \left(\frac{1}{4}\right)^x \). Find \( f(3) \).
[4.2 NC] Graph the function.
87) \( f(x) = 4^x \)

[4.2] Solve the equation.
88) \( \left( \frac{1}{4} \right)^x = 256 \)
89) \( 16^x - 2 = 324^x \)
90) \( e^{5x} - 1 = (e^4)^{-x} \)
91) \( \left( \frac{1}{3} \right)^{3x + 6} = 9x - 5 \)
92) \( (\sqrt{7})^x + 4 = 49^x \)

[4.3 NC] Evaluate the logarithm. Do not use a calculator.
93) \( \log_7 \frac{1}{7} \)
94) \( \log_9 1 \)
95) \( \log_5 (-1) \)

[4.3 NC] Solve the equation.
100) \( \log_3 81 = x \)
101) \( \log_x 16 = 4 \)
102) \( \log_5 x = -2 \)

[4.3 NC] Graph the function. Give the domain and range.
103) \( f(x) = \log_3 x \)

[4.3 NC] Write the expression as a sum, difference, or product of logarithms. Assume that all variables represent positive real numbers. Remove all exponents.
104) \( \log_7 (10x + 13y) \)
105) \( \log_2 \left( \frac{x^9 y^3}{2} \right) \)

[4.3 NC] Use the product, quotient, and power rules of logarithms to rewrite the expression as a single logarithm. Assume that all variables represent positive real numbers.
106) \( (\log_a q - \log_a r) + 6 \log_a p \)
107) \( \frac{1}{2} \log_2 x^4 + \frac{1}{4} \log_2 x^4 - \frac{1}{6} \log_2 x \)

[4.4] Use a calculator to find the logarithm. Give an approximation to four decimal places.
108) \( \ln 101 \)
[4.4] Use the change of base rule to find the logarithm to four decimal places.
109) \( \log_9 0.707 \)
110) \( \log \sqrt{5} \quad 183.3 \)

[4.5] Solve the equation. If necessary, round to the nearest thousandth.
111) \( 3x = 12 \)
112) \( 5(2x - 1) = 10 \)
113) \( 3x+7 = 7x \)
114) \( e^{2x} e^{4x} = e^{2} \)

[4.5 NC] Solve the equation and express the solution in exact form. Do not use a calculator
115) \( \log (x + 3) = 1 - \log x \)
116) \( \ln(4x - 5) + \ln (x - 3) = \ln 15 \)
117) \( \log_{8} x = \sqrt{\log_{8} x} \)
118) \( \log_{3} x^2 = (\log_{3} x)^2 \)

[4.6] Solve the problem.
119) A sample of 750 grams of radioactive substance decays according to the function
\( A(t) = 750e^{-0.48t}, \) where \( t \) is the time in years. How much of the substance will be left in the sample after 10 years? Round your answer to the nearest whole gram.
120) Assume the cost of a gallon of milk is $3.10. With continuous compounding, find the time it would take the cost to be 4 times as much (to the nearest tenth of a year), at an annual inflation rate of 6%. \( A = Pe^{rt} \)

[5.1] Solve the system by substitution.
121) \( x - 10y = 2 \)
\( x = 11y \)
122) \( x + 4y = -26 \)
\( 4x + 4y = -20 \)

[5.1] Solve the system by elimination.
123) \( x + 3y = 18 \)
\( 6x + 4y = 24 \)
124) \( 8x + 8y = 48 \)
\( -3x + 4y = -18 \)
125) \( \frac{9x}{4} + \frac{y}{4} = -2 \)
\( \frac{x}{4} + \frac{y}{4} = 0 \)

[5.1] Solve the system. If the system has infinitely many solutions, write the solution set with \( x \) arbitrary.
126) \( 4x - y = 2 \)
\( -8x + 2y = -4 \)
127) \( 8x - 10y = 1 \)
\( -16x + 20y = 1 \)
128) \( x - 3y = 9 \)
\( -3x + 9y = -27 \)

[5.2] Write the augmented matrix for the system. Do not solve the system.
129) \( 9x + 6y = 96 \)
\( 8x + 2y = 62 \)

[5.2] Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with \( y \) arbitrary.
130) \( 2x + 6y = 8 \)
\( 5x + 7y = -4 \)
131) \( -2x - 7y = -5 \)
\( -8x - 28y = 4 \)

[5.2] Use the Gauss–Jordan method to solve the system of equations. If the system has infinitely many solutions, let the last variable be the arbitrary variable.
132) \( 6x + 9y - z = 101 \)
\( x - 9y - 2z = -64 \)
\( 9x + y + z = 74 \)
133) \( x - y + 2z + w = 3 \)
\( y + z = 2 \)
\( z - w = 5 \)
1) -4
2) 3 - 18i
3) 39 + 27i
4) $\frac{6}{17} - \frac{37}{34}$
5) $\neq \sqrt{19}$
6) [-12, 2]
7) $\left\{ \frac{4}{3} - \frac{2}{5}, \frac{2}{7} - \frac{12}{7} \right\}$
8) $\left\{ \frac{3}{2}, \frac{3}{3} \right\}$
9) [-2 ± 3i]
10) $\left\{ -3, -\frac{1}{2} \right\}$
11) $\left\{ -6 \pm \sqrt{30}, \frac{3}{3} \right\}$
12) $\left\{ \frac{3}{2} \right\}$
13) 15 ft
14) $\left\{ \frac{2}{5}, 10 \right\}$
15) [-3]
16) [212]
17) [-5\sqrt{5}, -3, 3, 5\sqrt{5}]
18) $\left\{ \frac{3}{4}, \frac{5}{4} \right\}$
19) $\left\{ \frac{8}{5}, -\frac{5}{8} \right\}$
20) $(-\infty, 9]
21) (-\infty, -7) \cup [-1, \infty)
22) (-\infty, -5) \cup \left(-\frac{29}{8}, \infty\right)
23) $\left\{ \frac{11}{6}, \frac{1}{6} \right\}$
24) $\left\{ \frac{1}{5}, -\frac{7}{5} \right\}$
25) $\left\{ -3, \frac{13}{11} \right\}$
26) $\left\{ -4, \frac{7}{3} \right\}$
27) $(-\infty, \infty)
28) [-1]
29) $2\sqrt{37}$
30) $\left\{ \frac{7}{2}, 1 \right\}$
31) (14, -2)
32) $(x - 1)^2 + (y + 2)^2 = 16$
33) $(x + 1)^2 + (y + 9)^2 = 25$
34) (-7, 5); r = 5
35) domain: [-4, \infty); range: [0, \infty)
36) D = (-\infty, 15) \cup (15, \infty); R = (-\infty, 0) \cup (0, \infty)
37) domain: [3, \infty); range: (-\infty, \infty)
38) Not a function
39) Function
40) Not a function
41) 15
42) $\frac{a + 14}{5}$
43) Increasing [0, \infty); Decreasing (-\infty, 0]
44) $x = 2$
45) $y = \frac{8}{5}x - 3$
46) $y = \frac{4}{7}x - 9$
47) slope: $\frac{3}{4}$; y-intercept: -1
48) $(-\infty, 4) \cup (4, \infty)
49) y = x^3
50) Square Root Function $y = \sqrt{x}$
51)
52) 5
53) x-axis, y-axis, origin
54) Odd
55) Neither
56) $y = -(5x - 31 - 2$)
57)
58)
59) $\frac{3}{2}$
60) $2x + 6$
Answer Key
Testname: MATH 1314 GENERAL REVIEW

61) $\left[ \frac{4}{7}, \infty \right)$
62) -2251
63) x
64) Domain: $(-\infty, \infty)$; range: $[7, \infty)$
65)

66) Vertex: $\left( -\frac{1}{3}, \frac{20}{3} \right)$

67) $x^4 + 2x^3 - 3x^2 + 3x - 2 + \frac{1}{x + 5}$
68) 12
69) Yes
70) No
71) $(x - 7)(x - 4)(x + 7)$
72) 2, 5, -1; $f(x) = (x - 2)(x - 5)(x + 1)$
73) $\frac{1}{2}, -\frac{1}{2}, 7$; $f(x) = (2x - 1)(2x + 1)(x - 7)$
74) -8, multiplicity 2; 8, multiplicity 3
75) $f(x) = (x + 3)(x - 2)^2$
76)
77)
78) B
79) $y = \frac{1}{x}$
80)

81) Domain: $(-\infty, 0) \cup (0, \infty)$; Range: $(-\infty, 10) \cup (10, \infty)$
82) By making a horizontal shift of 3 units to the right and a vertical shift of 2 units up
83) No
84) Yes
85) $f^{-1}(x) = x^2 - 9, x \geq 0$
86) $\frac{1}{64}$
87)
88) (-4)
89) \(\begin{pmatrix} -\frac{1}{2} \\ -\frac{1}{2} \end{pmatrix} \)
90) \(\begin{pmatrix} \frac{1}{9} \\ \frac{1}{9} \end{pmatrix} \)
91) \(\begin{pmatrix} \frac{4}{3} \\ \frac{4}{3} \end{pmatrix} \)
92) \(\begin{pmatrix} -1 \\ \frac{1}{3} \end{pmatrix} \)
93) -1
94) 0
95) Undefined
96) \( \log_4 16 = 2 \)
97) \( \log_4 2 = \frac{1}{2} \)
98) \( 4^3 = 64 \)
99) \( 16^{1/4} = 2 \)
100) \( \{4\} \)
101) \( \{2\} \)
102) \( \begin{pmatrix} 1 \\ 25 \end{pmatrix} \)
103) domain: \((0, \infty)\); range: \((-\infty, \infty)\)

127) \( \emptyset \)
128) \( \left\{ \left( \frac{x}{3} - 3 \right) \right\} \)
129) \( \begin{bmatrix} 9 & 66 \\ 8 & 62 \end{bmatrix} \)
130) \( \{(-5, 3)\} \)
131) \( \emptyset \)
132) \( \{7, 7, 4\} \)
133) \( \{(-10 - 4w, -3 - w, 5 + w, w)\} \)

104) \( \log_7 (10x + 13y) \)
105) \( 9 \log_2 x + 3 \log_2 y - \log_2 2 \)
106) \( \log_3 \left( \frac{8p}{r} \right) \)
107) \( \log_2 (x^{17/6}) \)
108) \( 4.6151 \)
109) \( -0.1578 \)
110) \( 6.4757 \)
111) \( [2.262] \)
112) \( [1.215] \)
113) \( [9.076] \)
114) \( [0.333] \)
115) \( \{2\} \)
116) \( \left\{ \frac{17}{4} \right\} \)
117) \( [1, 8] \)
118) \( [1, 9] \)
119) \( 464 \text{ grams} \)
120) \( 23.1 \text{ years} \)
121) \( \{[22, 2]\} \)
122) \( \{[2, -7]\} \)
123) \( \{[0, 6]\} \)
124) \( \{[6, 0]\} \)
125) \( \{-1, 1\} \)
126) \( \{x, 4x - 2\} \)