# Math 1020/1021 Final Exam Review

**(Revised 11/21/2024)**

**Find an equation for the circle with the following characteristics.**

1. Endpoints of a diameter at $(-4, 3)$ and $(-4, -3)$.

   A. $(x-3)^2 + y^2 = 16$ B. $(x+4)^2 + y^2 = 9$

   C. $x^2 + (y-3)^2 = 16$ D. $(x+4)^2 + y^2 = 3$

2. Endpoints of a diameter at $(-1, 6)$ and $(9, -2)$.

   A. $(x-2)^2 + (y-4)^2 = 41$ B. $(x-4)^2 + (y-2)^2 = 41$

   C. $(x-4)^2 + y^2 = 16$ D. $x^2 + (y-2)^2 = 25$

3. Center at $(5, -5)$ and diameter of length 7.2.

   A. $(x+5)^2 - (y+5)^2 = 51.84$ B. $(x-5)^2 + (y-5)^2 = 3.6$

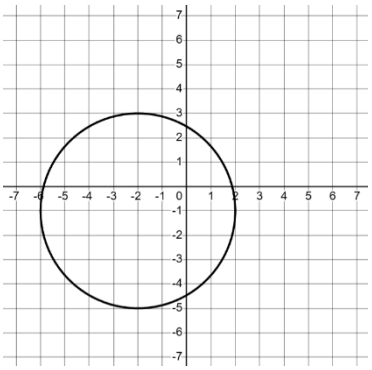
   C. $(x+5)^2 + (y-5)^2 = 12.96$ D. $(x-5)^2 + (y+5)^2 = 12.96$

4. Center at $(3, -4)$ and radius of length $\frac{3}{4}$.

   A. $(x-3)^2 + (y+4)^2 = \frac{9}{16}$ B. $(x+3)^2 + (y-4)^2 = \frac{16}{9}$

   C. $(x-3)^2 + (y-4)^2 = \frac{9}{16}$ D. $(x+3)^2 - (y+4)^2 = 9$

**Find the equation of the circle graphed.**

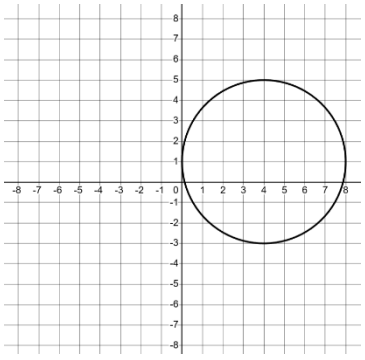
5. 

   A. $(x+2)^2 + (y-1)^2 = 4^2$

   B. $(x-2)^2 + (y+1)^2 = 4^2$

   C. $(x-2)^2 + (y-1)^2 = 4^2$

   D. $(x+2)^2 + (y+1)^2 = 4^2$

6. 

   A. $(x-4)^2 + (y+1)^2 = 4^2$

   B. $(x+4)^2 + (y+1)^2 = 4^2$

   C. $(x-4)^2 + (y-1)^2 = 4^2$

   D. $(x+4)^2 + (y-1)^2 = 4^2$

7. Given that $f(x) = x^2 - 3x + 5$, find $f(-1)$.

   A. 3 B. 9 C. $-1$ D. $-7$

8. Given that $f(x) = x^2 + 5x + 2$, find $f(-2)$.

   A. $-4$ B. 12 C. $-8$ D. 16

9. The mathematical model $C = 300x + 60{,}000$ represents the cost in dollars a company has in manufacturing $x$ items during a month. How many items were produced if costs reached \$270,000?

   A. 700 items B. 500 items C. 1100 items D. 269,700 items

10. Suppose the sales of a particular brand of appliance satisfy the relationship $S(x) = 110x + 1700$, where $S(x)$ represents the number of sales in year $x$, with $x = 0$ corresponding to 1982. In what year would the sales be 2690?

    A. 1991 B. 1990 C. 1993 D. 1988

11. Find the slope-intercept equation of the line passing through the points $(-6, -3)$ and $(3, 12)$.

    A. $y = -\frac{3}{5}x - \frac{33}{5}$ B. $y = \frac{5}{3}x + 7$ C. $y = -\frac{3}{5}x - \frac{39}{5}$ D. $y = \frac{5}{3}x - 6$

12. Find the slope-intercept equation of the line passing through the points $(-1, 7)$ and $(2, -5)$.

    A. $y = -4x + 3$ B. $y = 4x + 11$ C. $y = \frac{1}{4}x + \frac{29}{4}$ D. $y = -\frac{1}{4}x + \frac{27}{4}$

13. Find the slope-intercept equation of the line passing through the points $(-5, 1)$ and $(7, -5)$.

    A. $y = -\frac{1}{2}x + \frac{3}{2}$ B. $y = -2x - \frac{2}{3}$ C. $y = -\frac{1}{2}x - \frac{3}{2}$ D. $y = 2x + \frac{2}{3}$

14. Find the slope-intercept equation of the line passing through the point $(-5, -3)$ and perpendicular to $-5x + 6y = 7$.

    A. $y = -\frac{5}{6}x - 45$ B. $y = -\frac{6}{5}x$ C. $y = -\frac{6}{5}x - 9$ D. $y = \frac{6}{5}x + 9$

15. Find the slope-intercept equation of the line passing through the point $(-2, -12)$ and parallel to $-9x + 4y = -10$.

    A. $y = \frac{4}{9}x + \frac{4}{3}$ B. $y = \frac{9}{4}x - \frac{15}{2}$ C. $y = -\frac{9}{4}x + \frac{15}{2}$ D. $y = \frac{1}{2}x - \frac{5}{2}$

**Solve using the substitution method.**

16. $x + y = 3$
    $x - y = -15$

    A. $(6, 10)$ B. $(-6, 9)$ C. $(-7, 10)$ D. No solution

17. $x + 9y = 11$
    $5x + 45y = 55$

    A. $(5, 5)$ B. $(0, 0)$ C. No Solution D. Infinitely many solutions

**Solve using the elimination method.**

18. $x - 6y = 18$
    $-5x - 5y = 15$

    A. $(3, 0)$ B. $(1, -4)$ C. $(0, -3)$ D. No Solutions

19. $9x - 5y = -11$
    $-4x - 2y = -12$

    A. $(0, 5)$ B. $(1, 4)$ C. $(1, 5)$ D. No Solution

20. Tickets for the school play cost $5 for students and $8 for adults. On opening night, all 360 seats were filled, and the box office revenues were $2610. How many student and how many adult tickets were sold?

    A. 90 student and 270 adult B. 360 student and 0 adult

    C. 320 adult and 40 student D. 90 adult and 270 student

21. A student takes out two loans totaling $11,000 to help pay for college expenses. One loan is at 5% simple interest, and the other is at 4% simple interest. The first-year interest is $470. Find the amount of the loan at 4%.

    A. $3000 B. $150 C. $8000 D. $320

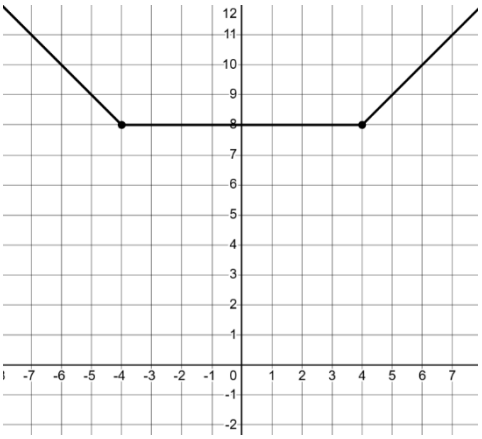
22. Solve the linear inequality and express the solution in interval notation: $-3x + 7(x + 1) < 9$

    A. $(-\infty, 1)$ B. $\left(\frac{1}{2}, \infty\right)$ C. $(1, \infty)$ D. $\left(-\infty, \frac{1}{2}\right)$

23. Solve the linear inequality and express the solution in interval notation: $9(x-1)+4>3x+8$

A. $\left(-\infty,\frac{13}{12}\right)$ B. $\left(\frac{13}{6},\infty\right)$ C. $\left(\frac{13}{12},\infty\right)$ D. $\left(-\infty,\frac{13}{6}\right)$

24. Determine the intervals on which the function is increasing, decreasing, and constant.



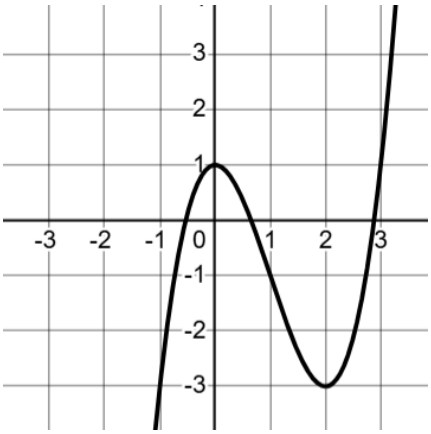
A. Increasing on $(-\infty,4)$; Decreasing on $(-4,\infty)$; Constant on $(4,\infty)$

B. Increasing on $(-\infty,4)$; Decreasing on $(-\infty,-4)$; Constant on $(4,\infty)$

C. Increasing on $(4,\infty)$; Decreasing on $(-4,\infty)$; Constant on $(-4,4)$

D. Increasing on $(4,\infty)$; Decreasing on $(-\infty,-4)$; Constant on $(-4,4)$

25. Using the graph, determine any relative maxima and relative minima of the function.
$f(x)=x^3-3x^2+1$



A. Relative maximum: none; Relative minimum: $-3$ at $x=2$

B. Relative maximum: $-3$ at $x=2$; Relative minimum: $1$ at $x=0$

C. Relative maximum: $1$ at $x=0$; Relative minimum: $-3$ at $x=2$

D. Relative maximum: $1$ at $x=0$; Relative minimum: none

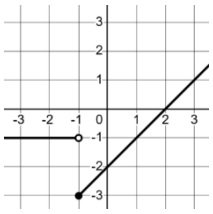
26. Find $f(-8)$ for the piecewise function below.

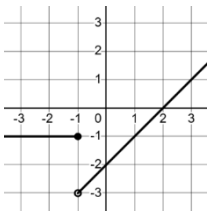
$$f(x)=\begin{cases}6x & for\ x\le -1\\ x-7 & for\ x>-1\end{cases}$$

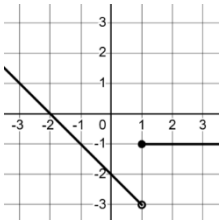
A. $-15$ B. $48$ C. $-48$ D. $1$

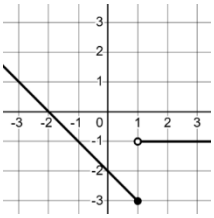
**Graph the piecewise function.**

27. $f(x) = \begin{cases} -1 & for\ x \geq 1 \\ -2 - x & for\ x < 1 \end{cases}$

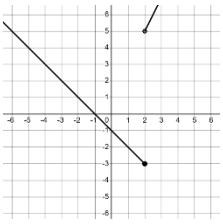
A. 

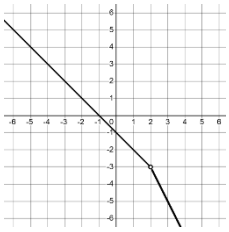
B. 

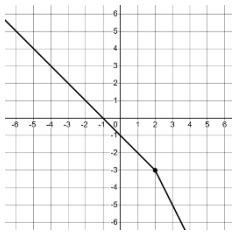
C. 

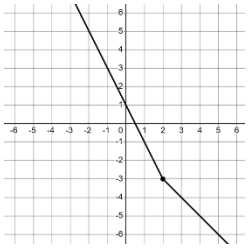
D. 

28. $f(x) = \begin{cases} -1 - x & for\ x \leq 2 \\ 1 - 2x & for\ x > 2 \end{cases}$

A. 

B. 

C. 

D. 

29. $f(x) = 9x - 8\ , g(x) = 6x - 4$. Find $(f - g)(x)$.

A. $15x - 12$ B. $3x - 4$ C. $-3x + 4$ D. $3x - 12$

30. $f(x) = 4 - 3x\ , g(x) = -7x + 3$. Find $(f + g)(x)$.

A. $-7x + 4$ B. $-3x$ C. $-10x + 7$ D. $4x + 7$

31. $f(x) = 4x - 3\ , g(x) = 8x - 1$. Find $(fg)(x)$.

A. $12x^2 - 28x - 4$ B. $32x^2 + 3$ C. $32x^2 - 25x + 3$ D. $32x^2 - 28x + 3$

32. $f(x) = 7x - 3\ , g(x) = 5x - 2$. Find $(f/g)(x)$.

A. $\frac{5x-2}{7x-3}$ B. $\frac{5x+2}{7x+3}$ C. $\frac{7x-3}{5x-2}$ D. $\frac{7x+3}{5x+2}$

33. $f(x) = 2x - 5\ , g(x) = \sqrt{x + 8}$. Find the domain of $f/g$.

A. $[0, \infty)$ B. $(-8, \infty)$ C. $[8, \infty)$ D. $(-8, 8)$

34. $f(x) = x^2 - 25\ , g(x) = 2x + 3$. Find the domain of $f - g$.

A. $(-5, 5)$ B. $[0, \infty)$ C. $[5, \infty)$ D. $(-\infty, \infty)$

35. $f(x) = x^2 - 4$ , $g(x) = 2x + 3$. Find the domain of $f/g$.

A. $(-\infty, \infty)$ B. $\left[-\frac{3}{2}, \infty\right)$ C. $(-2, 2)$ D. $\left(-\infty -\frac{3}{2}\right) \cup \left(-\frac{3}{2}, \infty\right)$

**For the function, construct and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$.**

36. $f(x) = 3x^2 + 4x$

A. $6x + 3h + 4$ B. $6x + 4$ C. $6x^2 + 3h + 4x$ D. $9x - 5h + 8$

37. $f(x) = 9x^2 + 9x$

A. $18x + 9$ B. $27x - 11h + 18$ C. $18x^2 + 9h + 9x$ D. $18x + 9h + 9$

38. $f(x) = \frac{x-3}{5}$, $g(x) = 4x + 1$. Find $(g \circ f)(-7)$.

A. $-6$ B. $-7$ C. $54$ D. $-10$

39. $f(x) = \frac{x-7}{9}$ , $g(x) = 7x + 9$. Find $(g \circ f)(-20)$.

A. $-\frac{46}{3}$ B. $-12$ C. $393$ D. $-48$

40. $f(x) = 5x + 11$ , $g(x) = 4x - 1$. Find $(f \circ g)(x)$.

A. $20x + 16$ B. $20x + 10$ C. $20x + 6$ D. $20x + 43$

41. $f(x) = \frac{x-10}{7}$ , $g(x) = 7x + 10$. Find $(g \circ f)(x)$.

A. $x$ B. $x - \frac{10}{7}$ C. $x + 20$ D. $7x + 60$

42. $f(x) = \frac{4}{x+3}$ , $g(x) = x + 5$. Find the domain of $f \circ g$.

A. $(-\infty, -8) \cup (8, \infty)$ B. $(-\infty, \infty)$ C. $(-\infty, -8] \cup [-8, \infty)$ D. $(-\infty, -3) \cup (-3, \infty)$

43. $f(x) = \frac{8}{x+10}$ , $g(x) = x + 5$. Find the domain of $g \circ f$.

A. $(-\infty - 10] \cup [-10, \infty)$ B. $(-\infty, -15) \cup (-15, \infty)$ C. $(-\infty, \infty)$ D. $(-\infty, -10) \cup (-10, \infty)$

44. How can the graph of $f(x) = -\sqrt{x+7}$ be obtained from the graph of $y = \sqrt{x}$?

A. Shift it horizontally 7 units to the left. Reflect it across the $y$-axis.

B. Shift it horizontally 7 units to the right. Reflect it across the $x$-axis.

C. Shift it horizontally 7 units to the left. Reflect it across the $x$-axis.

D. Shift it horizontally $-7$ units to the left. Reflect it across the $x$-axis.

45. How can the graph of $f(x) = \frac{1}{2}(x+7)^2 - 6$ be obtained from the graph of $f(x) = x^2$?

A. Shift it horizontally 7 units to the left. Shrink it vertically by a factor of 1/2. Shift it 6 units down.

B. Shift it horizontally 7 units to the left. Shrink it vertically by a factor of 2. Shift it 6 units down.

C. Shift it horizontally 7 units to the right. Stretch it vertically by a factor of 2. Shift it 6 units up.

D. Shift it horizontally 7 units to the right. Shrink it vertically by a factor of 1/2. Shift it 6 units down.

46. How can the graph of $f(x) = -(x-9)^2 + 8$ be obtained from the graph of $f(x) = x^2$?

A. Shift it horizontally 9 units to the right. Reflect it across the $y$-axis. Shift it 8 units up.

B. Shift it horizontally 9 units to the right. Reflect it across the $y$-axis. Shift it 8 units down.

C. Shift it horizontally 9 units to the left. Reflect it across the $x$-axis. Shift it 8 units up.

D. Shift it horizontally 9 units to the right. Reflect it across the $x$-axis. Shift it 8 units up.

**Simplify. Write your answers in the form of $a + bi$, where $a$ and $b$ are real numbers.**

47. $\frac{7+i}{-5-6i}$

A. $-\frac{41}{61} - \frac{37}{61}i$ B. $-\frac{41}{61} + \frac{37}{61}i$ C. $-\frac{41}{61}$ D. $\frac{37}{61}i$

48. $\frac{8-i}{-4+7i}$

A. $\frac{3}{5} - \frac{4}{5}i$ B. $-\frac{3}{5} - \frac{4}{5}i$ C. $-\frac{4}{5}i$ D. $\frac{1}{65} - \frac{4}{5}i$

49. Solve the equation: $x^2 - 6x - 27 = 0$

A. $-24, -3$ B. $\sqrt{-27}, -\sqrt{-27}$ C. $9, -3$ D. $-9, 3$

**Use the quadratic formula to find the exact solutions.**

50. $x^2 - 14x + 74 = 0$

A. $14 \pm 10i$ B. $-7 \pm 5i$ C. $7 \pm 5i$ D. $12, 2$

51. $x^2 = 15 + 3x$

A. $\frac{3 \pm \sqrt{69}}{2}$ B. $\frac{3}{2} \pm \frac{\sqrt{69}}{2} i$ C. $3 \pm \sqrt{69}\, i$ D. $3, 15$

52. $4x^2 - 7x = 1$

A. $-\frac{7}{8} \pm \frac{\sqrt{65}}{8} i$ B. $\frac{7}{8} \pm \frac{\sqrt{65}}{8} i$ C. $\frac{7 \pm \sqrt{65}}{8}$ D. $\frac{-7 \pm \sqrt{65}}{8}$

**Find the vertex of the parabola.**

53. $f(x) = 3x^2 - 18x + 25$

A. $(-2, 3)$ B. $(2, -3)$ C. $(-3, 2)$ D. $(3, -2)$

54. $f(x) = x^2 - 9x + 12$

A. $\left(\frac{9}{2}, -\frac{33}{4}\right)$ B. $\left(\frac{9}{4}, \frac{39}{2}\right)$ C. $\left(\frac{9}{2}, \frac{291}{4}\right)$ D. $\left(-\frac{9}{2}, \frac{291}{4}\right)$

**Find the range of the given function.**

55. $f(x) = 4x^2 - 8x + 1$

A. $(-\infty, 3]$ B. $[-3, \infty)$ C. $[1, \infty)$ D. $(-\infty, -1]$

56. $f(x) = -4x^2 - 40x - 104$

A. $(-\infty, -4]$ B. $[4, \infty)$ C. $(-\infty, -5]$ D. $[5, \infty)$

**Find the intervals on which the function is increasing and the intervals on which the function is decreasing.**

57. $f(x) = x^2 - 12x + 11$

A. Increasing on $(-\infty, 6)$; decreasing on $(6, \infty)$ B. Increasing on $(-\infty, -6)$; decreasing on $(-6, \infty)$

C. Increasing on $(-6, \infty)$; decreasing on $(-\infty, -6)$ D. Increasing on $(6, \infty)$; decreasing on $(-\infty, 6)$

58. $f(x) = -x^2 + 10x + 24$

A. Increasing on $(-5, \infty)$; decreasing on $(-\infty, -5)$ B. Increasing on $(-\infty, 5)$; decreasing on $(5, \infty)$

C. Increasing on $(5, \infty)$; decreasing on $(-\infty, 5)$ D. Increasing on $(-\infty, -5)$; decreasing on $(-5, \infty)$

**Solve.**

59. $\frac{5x}{x-5} - \frac{4}{x} = \frac{20}{x^2-5x}$ Be sure to check that your answers are valid

A. $\frac{4}{5}, -\frac{4}{5}$ B. $\frac{5}{4}$ C. $\frac{2}{5}, -\frac{2}{5}$ D. $\frac{4}{5}$

60. $\frac{6}{m+4} + \frac{7}{m} = \frac{4m+4}{m^2+4m}$ Be sure to check that your answers are valid

A. $\frac{8}{3}$ B. $-\frac{8}{3}, 24$ C. $-\frac{8}{3}$ D. $-\frac{8}{3}, \frac{8}{3}$

61. $\sqrt{4q-3} = 3$ Be sure to check your answer

A. 9 B. 3 C. $\frac{9}{4}$ D. $\frac{3}{2}$

62. $\sqrt[3]{x+1} = 2$

A. 3 B. 7 C. 8 D. 1

63. $x = \sqrt{x+13} + 7$ Be sure to check your answer(s).

A. $-9$ B. 12 C. 3 D. $3, 12$

64. $|7x + 3| = 4$

A. $-\frac{7}{3}, \frac{1}{3}$ B. $-\frac{1}{7}, 1$ C. No Solution D. $-1, \frac{1}{7}$

65. $|x - 5| + 6 = 8$

A. $-7, -3$ B. No Solution C. 7 D. $3, 7$

66. $|4x - 7| \geq 9$

A. $(-\infty, -4] \cup [9, \infty)$ B. $\left[-\frac{1}{2}, 4\right]$ C. $\left(-\infty, -\frac{1}{2}\right] \cup [4, \infty)$ D. $[4, \infty)$

67. $|13x - 8| < -3$

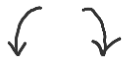
A. $\left(-\infty, \frac{5}{13}\right) \cup \left(\frac{11}{13}, \infty\right)$ B. $\left(\frac{5}{13}, \frac{11}{13}\right)$ C. $(-\infty, \infty)$ D. No Solution

68. $|6x + 7| < 3$

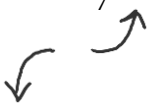
A. $\left(-\infty, -\frac{5}{3}\right) \cup \left(-\frac{2}{3}, \infty\right)$ B. $\left(-\frac{5}{3}, -\frac{2}{3}\right)$ C. $\left(-\infty, -\frac{5}{3}\right)$ D. $(-\infty, 6)$

**Find the correct end behavior diagram for the given polynomial function.**

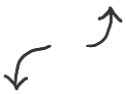
69. $f(x) = 6x^3 + 6x^2 - 7x + 3$

A.  B.  C.  D. 

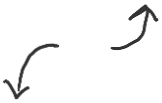
70. $f(x) = -\frac{1}{7}x^3 + 2x^2 + 5x - 6$

A.  B.  C.  D. 

71. $f(x) = 2.43x^4 + 7x^2 + x - 7$

A.  B.  C.  D. 

72. $f(x) = -x^6 + 5x^5 - x^2 - 8x + 5$

A.  B.  C.  D. 

**Use synthetic division to find the quotient and remainder.**

73. $(x^3 - x^2 + 6) \div (x + 2)$

A. $Q(x) = (x^2 - 3x + 6); R(x) = -6$ B. $Q(x) = (3x^2 - 4x + 2); R(x) = 7$

C. $Q(x) = (x^2 + x + 2); R(x) = -6$ D. $Q(x) = (x^2 - 3x + 6); R(x) = 2$

74. $(2x^4 - x^3 - 15x^2 + 3x) \div (x + 3)$

A. $Q(x) = (2x^3 - 7x^2 + 6x - 15); R(x) = 45$ B. $Q(x) = (2x^3 - 5x^2 + 3); R(x) = 9$

C. $Q(x) = (2x^3 + 5x^2 + 3); R(x) = 9$ D. $Q(x) = (2x^3 - 7x^2 + 6x - 15); R(x) = -45$

75. $(3x^4 - 9x^3 + 2x^2 - 6x) \div (x - 3)$

A. $Q(x) = (3x^3 + x^2 - x + 3); R(x) = 9$ B. $Q(x) = (3x^3 + 2x); R(x) = 0$

C. $Q(x) = (3x^3 - 2x); R(x) = 0$ D. $Q(x) = (3x^2 + 2x); R(x) = 0$

76. Suppose that a polynomial function of degree 4 with rational coefficients has $6, 4, \sqrt{5}$ as zeros. Find the other zero.

A. $\sqrt{5}\,i$ B. $-\sqrt{5}$ C. $i + \sqrt{5}$ D. $-6$

77. Suppose that a polynomial function of degree 5 with rational coefficients has $6, -5+4i, 4-\sqrt{6}$ as zeros. Find the other zeros.

A. $5-4i, -4+\sqrt{6}$ B. $5-4i, 4+\sqrt{6}$ C. $-5-4i, 4+\sqrt{6}, -6$ D. $-5-4i, 4+\sqrt{6}$

78. Suppose that a polynomial function of degree 6 with rational coefficients has $3i, -3+2i, 2-\sqrt{3}$ as zeros. Find the other zeros.

A. $3-2i, -2+\sqrt{3}$ B. $-3i, 3-2i, -2+\sqrt{3}$ C. $-3i, -3-2i, 2+\sqrt{3}$ D. $-3-2i, 2+\sqrt{3}$

**Find a polynomial function of lowest degree with rational coefficients that has the given numbers as some of its zeros.**

79. $6i, \sqrt{5}$

A. $f(x) = x^4 - 62x^2 + 180$ B. $f(x) = x^4 - 31x^2 - 180$

C. $f(x) = x^4 + 62x^2 + 180$ D. $f(x) = x^4 + 31x^2 - 180$

80. $-4i, \sqrt{2}$

A. $f(x) = x^4 - 28x^2 + 32$ B. $f(x) = x^4 + 14x^2 - 32$

C. $f(x) = x^4 - 14x^2 - 32$ D. $f(x) = x^4 + 28x^2 + 32$

**Find the domain of the rational function.**

81. $f(x) = \frac{17}{7-x}$

A. $(-\infty, -17) \cup (-17, 17) \cup (17, \infty)$ B. $(-\infty, -7) \cup (-7, 7) \cup (7, \infty)$

C. $(-\infty, 17) \cup (17, \infty)$ D. $(-\infty, 7) \cup (7, \infty)$

82. $f(x) = \frac{x-1}{x^2-9}$

A. $(-\infty, \infty)$ B. $(-\infty, -3) \cup (-3, \infty)$

C. $(-\infty, 1) \cup (1, \infty)$ D. $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

**Find the vertical asymptote(s) of the graph of the given function.**

83. $f(x) = \frac{x-11}{x^2-1}$

A. $x = 1, x = -1$ B. $y = 1, y = -1$ C. $x = 11$ D. $x = 1$

84. $f(x) = \frac{x^2+2x}{x^2-7x-18}$

A. $x = 9, x = -2$ B. $x = 9$ C. $x = -9, x = 2$ D. None

85. $f(x) = \frac{x^2+2x-8}{x^2-4x-12}$

A. $x = 2, x = -6$ B. $x = 6$ C. $x = -2, x = 6$ D. $y = -2, y = 6$

**Find the horizontal asymptote, if any, of the rational function.**

86. $f(x) = \frac{x+9}{9x^2+8x-6}$

A. $y = \frac{1}{9}$ B. $y = 1$ C. $y = 0$ D. None

87. $f(x) = \frac{3x^2+8}{x^2-8}$

A. $y = 0$ B. $y = 8$ C. $y = 3$ D. None

88. $f(x) = \frac{2x^3-5x-3}{3x^3-9x+4}$

A. $y = \frac{2}{3}$ B. $y = \frac{5}{9}$ C. $y = 0$ D. None

89. For the function $f(x) = x^2 - 4x - 12$, solve $f(x) \leq 0$.

A. $[6, \infty)$ B. $[-2, 6]$ C. $(-\infty, -2]$ D. $(-\infty - 2] \cup [6, \infty)$

90. For the function $f(x) = x^2 + 2x - 35$, solve $f(x) > 0$.

A. $(-\infty, -7)$ B. $(5, \infty)$ C. $(-\infty, -7) \cup (5, \infty)$ D. $(-7, 5)$

**Solve the given inequality. (a related function is graphed)**

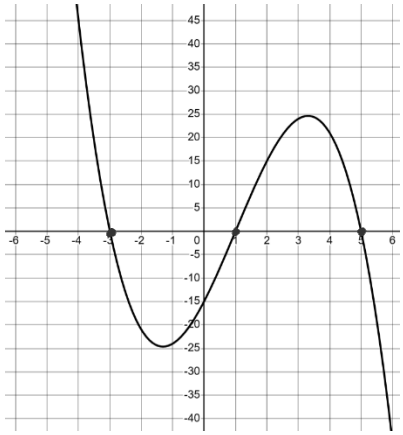
91. $-x^3 + 3x^2 + 13x - 15 < 0$

A. $[-3, 1] \cup [5, \infty)$

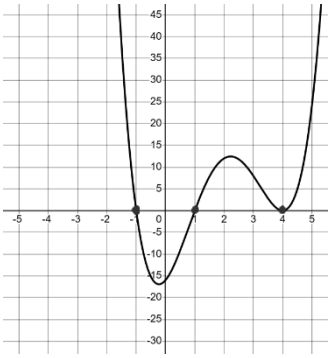
B. $(-\infty, -3) \cup (1, 5)$

C. $(-3, 1) \cup (5, \infty)$

D. $(5, \infty)$



92. $x^4 - 8x^3 + 15x^2 + 8x - 16 \geq 0$



A. $(-\infty, -1] \cup [1, \infty)$

B. $(-\infty, -1] \cup [1, 4]$

C. $(-\infty, -1] \cup (1, 4) \cup (4, \infty)$

D. $(-\infty, -1) \cup (1, 4) \cup (4, \infty)$

**Determine whether the given function is one-to-one. If it is one-to-one, find a formula for the inverse.**

93. $f(x) = 8x + 3$

A. $f^{-1}(x) = \frac{x}{8} - 3$ B. Not one-to-one C. $f^{-1}(x) = \frac{x+3}{8}$ D. $f^{-1}(x) = \frac{x-3}{8}$

94. $f(x) = \frac{6}{x+5}$

A. Not one-to-one B. $f^{-1}(x) = \frac{-5x+6}{x}$ C. $f^{-1}(x) = \frac{x}{5+6x}$ D. $f^{-1}(x) = \frac{5+6x}{x}$

95. $f(x) = \frac{-8x+4}{4x+6}$

A. $f^{-1}(x) = \frac{-8x+4}{4x+6}$ B. $f^{-1}(x) = \frac{-6x+4}{4x+8}$ C. Not one-to-one D. $f^{-1}(x) = \frac{4x+8}{-6x+4}$

**Find the domain and range of the inverse of the given function.**

96. $f(x) = \frac{8}{x-9}$

A. Domain: $(-\infty, 9) \cup (9, \infty)$; Range: $(-\infty, \infty)$

B. Domain: $(-\infty, \infty)$; Range: $(-\infty, 9) \cup (9, \infty)$

C. Domain: $(-\infty, 9) \cup (9, \infty)$; Range: $(-\infty, 0) \cup (0, \infty)$

D. Domain: $(-\infty, 0) \cup (0, \infty)$; Range: $(-\infty, 9) \cup (9, \infty)$

97. $f(x) = \frac{2x+1}{x-5}$

A. Domain: $(-\infty, 2) \cup (2, \infty)$; Range: $(-\infty, 5) \cup (5, \infty)$

B. Domain: $(-\infty, \infty)$; Range: $(-\infty, \infty)$

C. Domain: $(-\infty, \infty)$; Range: $(-\infty, 5) \cup (5, \infty)$

D. Domain: $(-\infty, 5) \cup (5, \infty)$; Range: $(-\infty, 2) \cup (2, \infty)$

**Graph the function. Describe its position relative to the graph of the indicated basic function.**

98. $f(x) = 2^{x-1} - 2$; relative to $f(x) = 2^x$

A. Moved left 1 unit, moved down 2 units

B. Moved right 1 unit, moved up 2 units

C. Moved right 1 unit, moved down 2 units

D. Moved left 1 unit, moved up 2 units

99. $f(x) = 3^{x+3} - 5$; relative to $f(x) = 3^x$

A. Moved left 3 units, moved up 5 units

B. Moved right 3 units, moved up 5 units

C. Moved right 3 units, moved down 5 units

D. Moved left 3 unit, moved down 5 units

100. Let $f(x) = 3^{5x}$. Evaluate $f(-4.1)$ and round to 3 decimal places.

A. $1.656 \times 10^{-10}$ B. $0.055 \times 10^{-10}$ C. $0.011 \times 10^{-10}$ D. $4.572 \times 10^{-10}$

101. Let $f(x) = e^{3x}$. Evaluate $f(-5.4)$ and round to 3 decimal places.

A. $9.214 \times 10^{-8}$ B. $1.371 \times 10^{-8}$ C. $0.005 \times 10^{-8}$ D. $20.086 \times 10^{-8}$

**Find the value of the expression.**

102. $log_{10} 1{,}000{,}000$

A. $-6$ B. 6,000,000 C. 6 D. 1,000,000

103. $log_4 \frac{1}{16}$

A. $-2$ B. 4 C. 8 D. $1/2$

**Find the domain and the vertical asymptote of the function.**

104. $f(x) = log(x - 2)$

A. Domain: $(1, \infty)$; vertical asymptote: $x = 1$ B. Domain: $(0, \infty)$; vertical asymptote: $x = 0$

C. Domain: $(2, \infty)$; vertical asymptote: $x = 2$ D. Domain: $(-2, \infty)$; vertical asymptote: $x = -2$

105. $f(x) = log\ (x + 4)$

A. Domain: $(4, \infty)$; vertical asymptote: $x = 4$ B. Domain: $(1, \infty)$; vertical asymptote: $x = 1$

C. Domain: $(0, \infty)$; vertical asymptote: $x = 0$ D. Domain: $(-4, \infty)$; vertical asymptote: $x = -4$

**Find the following using a calculator. Round to four decimal places.**

106. $log47$

A. 4.3501 B. 1.6721 C. 1.1721 D. 3.8501

107. $ln19$

A. 2.9444 B. 1.2788 C. 7.0111 D. 0.3386

108. Given the function $f(x) = 3^{x+4}$, which of the following is the equation for $f^{-1}(x)$?

A. $f^{-1}(x) = \log_3(x - 4)$ B. $f^{-1}(x) = \log_3 x - 4$ C. $f^{-1}(x) = 3^{x-4}$ D. $f^{-1}(x) = \log_4(x + 3)$

**Express as a single logarithm and, if possible, simplify.**

109. $log_a 17 + log_a 3$

A. $\log_a \frac{17}{3}$ B. $17 \log_a 3$ C. $\log_a 51$ D. $\log_a 17 \cdot \log_a 3$

110. $\frac{1}{2} lnx - ln8$

A. $\ln\left(\frac{x}{2} - 8\right)$ B. $\ln(\sqrt{x} - 8)$ C. $\ln\left(\frac{\sqrt{x}}{8}\right)$ D. $\ln\left(\sqrt{\frac{x}{8}}\right)$

111. $\frac{1}{2} log_a x + 5\, log_a y - 2\, log_a x$

A. $\log_a x^4 y^5$ B. $\log_a x^2 y^5$ C. $\log_a \left(\frac{y^5}{x^{3/2}}\right)$ D. $\log_a \sqrt{x}\, y^5$

**Solve the exponential or logarithmic equation.**

112. $4^x = 11$

A. 2.750 B. 1.012 C. 0.578 D. 1.730

113. $3^{7x} = 3$

A. $\frac{1}{7}$ B. 1 C. 3 D. 7

114. $3^{10-2x} = 81$

A. 27 B. 3 C. 5 D. $-3$

115. $log_6 x = 3$

A. 729 B. 1,000,000 C. 18 D. 216

116. $lnx = 2$

A. $e^2$ B. $ln2$ C. 100 D. $2e$

117. $log_3(2x - 2) = 1$

A. $\frac{5}{3}$ B. 3 C. $\frac{5}{2}$ D. $\frac{\log_3 1 + 2}{2}$

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## Math1020/1021 Final Exam Review Solutions

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | B | | 26 | C | | 51 | A | | 76 | B | | 101 | A |
| 2 | B | | 27 | C | | 52 | C | | 77 | D | | 102 | C |
| 3 | D | | 28 | C | | 53 | D | | 78 | C | | 103 | A |
| 4 | A | | 29 | B | | 54 | A | | 79 | D | | 104 | C |
| 5 | D | | 30 | C | | 55 | B | | 80 | B | | 105 | D |
| 6 | C | | 31 | D | | 56 | A | | 81 | D | | 106 | B |
| 7 | B | | 32 | C | | 57 | D | | 82 | D | | 107 | A |
| 8 | A | | 33 | B | | 58 | B | | 83 | A | | 108 | B |
| 9 | A | | 34 | D | | 59 | D | | 84 | B | | 109 | C |
| 10 | A | | 35 | D | | 60 | C | | 85 | C | | 110 | C |
| 11 | B | | 36 | A | | 61 | B | | 86 | C | | 111 | C |
| 12 | A | | 37 | D | | 62 | B | | 87 | C | | 112 | D |
| 13 | C | | 38 | B | | 63 | B | | 88 | A | | 113 | A |
| 14 | C | | 39 | B | | 64 | D | | 89 | B | | 114 | B |
| 15 | B | | 40 | C | | 65 | D | | 90 | C | | 115 | D |
| 16 | B | | 41 | A | | 66 | C | | 91 | C | | 116 | A |
| 17 | D | | 42 | A | | 67 | D | | 92 | A | | 117 | C |
| 18 | C | | 43 | D | | 68 | B | | 93 | D | | | |
| 19 | B | | 44 | C | | 69 | B | | 94 | B | | | |
| 20 | A | | 45 | A | | 70 | D | | 95 | B | | | |
| 21 | C | | 46 | D | | 71 | A | | 96 | D | | | |
| 22 | D | | 47 | B | | 72 | C | | 97 | A | | | |
| 23 | B | | 48 | B | | 73 | A | | 98 | C | | | |
| 24 | D | | 49 | C | | 74 | A | | 99 | D | | | |
| 25 | C | | 50 | C | | 75 | B | | 100 | A | | | |