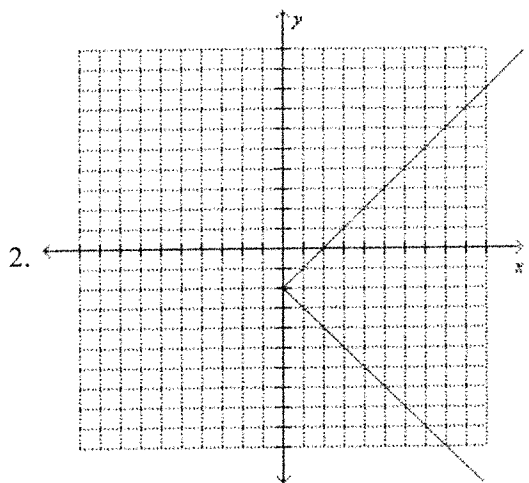


Semester Exam Review

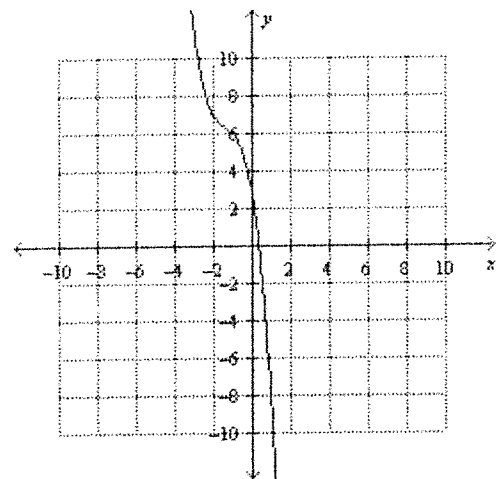
1. Determine the domain of the function $h(x) = \frac{2x}{x(x^2 - 64)}$.

Use the graph to determine the domain and range of the relation, and state whether the relation is a function.



3. Find $f(m + 2)$ for $f(x) = 2x^2 + 7x - 8$.

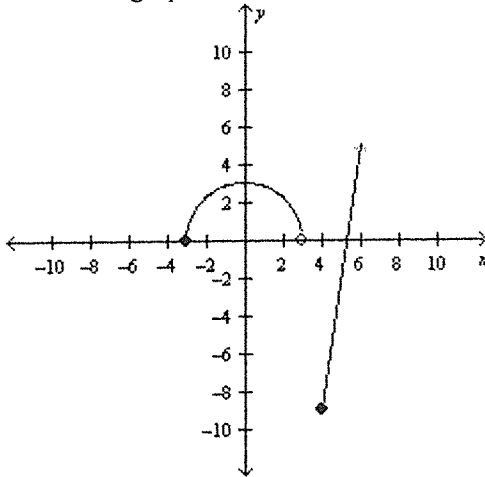
4. Use the graph of $f(x)$ to estimate $f(-1)$.



5. Identify the y-intercept and zeros of $y = x^4 - 15x^2 - 16$.

Semester Exam Review

6. Use the graph below to identify the domain and range.



7. Is the following function an even function, an odd function, or neither?

$$y = -6x^3 - 4x$$

8. Is the following function an even function, an odd function, or neither?

$$y = -6x^6 - 5x^2 - 2$$

9. Determine whether the graph of $f(x) = \frac{x^2 + 10x + 9}{x + 9}$ has infinite discontinuity, jump discontinuity, removable discontinuity, or is continuous.

10. Determine whether $f(x) = \begin{cases} x^2 + 4, & x < 6 \\ 5x + 10, & x \geq 6 \end{cases}$ is continuous at $x = 6$.

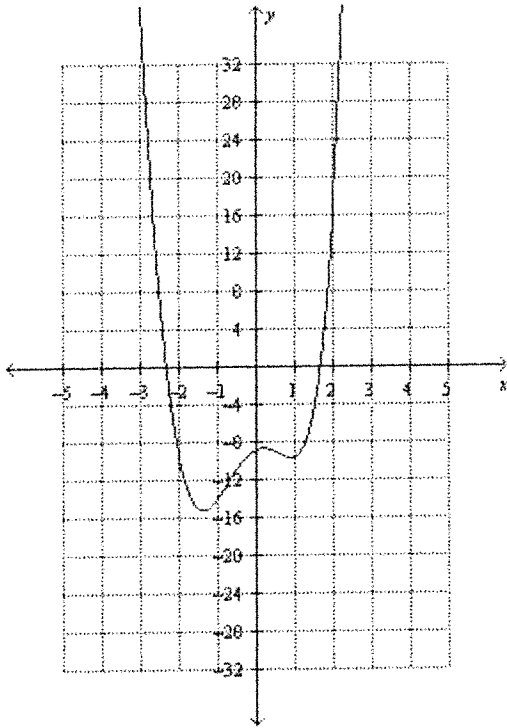
Without graphing, describe the end behavior of the graph of the function.

11. $f(x) = 4x - 5x^3$

Semester Exam Review

12. Estimate to the nearest 0.5 unit and classify the extrema for the graph of $f(x)$.

$$0.25x^5 + 2x^4 - 5x^2 + 2x + -9$$



13. Identify the symmetry of $2x - y^2 = 7$.

14. Identify the symmetry of $2xy = 8$.

15. Find the average rate of change of $f(x) = -5x^2 - 5x + 1$ on $[-2, 3]$.

16. For $f(x) = x^2 - 2x + 9$, find $\frac{f(4+h) - f(4)}{h}$

17. Graph $f(x) = \begin{cases} 9 - x & x < -2 \\ x^2 + 7 & -2 \leq x < 1 \\ \frac{4x + 4}{x} & 1 \leq x \end{cases}$

18. Graph $f(x) = \frac{x^2 + x - 2}{x^2 - x - 6}$, find intercepts, asymptotes, points of discontinuity.

Semester Exam Review

19. Discuss the behavior at each point of discontinuity in number 18.

20. Given: $f(x) = 6x - 8$

Find $f^{-1}(x)$. Then state whether $f^{-1}(x)$ is a function.

Determine whether f has an inverse function. If it does, find the inverse function and state any restrictions on its domain.

21. $f(x) = \frac{x-2}{x+7}$

22. State the number of possible real zeros and turning points of $f(x) = x^6 - 5x^5 + 6x^4$. Then determine all of the real zeros by factoring.

23. Determine the zeros for and the end behavior of $f(x) = x(x-5)(x-2)^4$.

Divide.

24. $(-4x^6 + 6x^5 - 6x^4 - 8x^3 + 6x^2 - 6x + 9) \div (2x - 2)$

25. Find $(x^3 - 9x^2 - 4x + 36) \div (x + 2)$ by using synthetic division.

26. Factor $x^3 + 19x^2 + 116x + 224$ completely using division if $(x + 4)$ is a factor.

Find each $f(c)$ using synthetic substitution.

27. $f(x) = -2x^5 + 4x^4 - 9x^3 - 5x^2 + 3x - 4$; $c = -1$

Determine if the following binomials are factors of $f(x)$. Then list all of the factors.

28. $f(x) = 4x^4 - 7x^3 + 16x^2 + 4x - 56$; $(-4x + 7)$, $(x + 7)$

29. Given that one zero is 4, find all zeros of $P(x) = x^3 + 6x^2 - 16x - 96$.

30. Find all the zeros of $f(x) = 15x^4 - 4x^3 - 18x^2 + 4x + 3$.

Write a polynomial function of least degree with real coefficients in standard form that has the given zeros.

31. $6 - \sqrt{7}$, $6 + \sqrt{7}$, and $-8 - 2i$

Use the given zero to find all real zeros of each function. Then write the linear factorization of the function.

32. $g(x) = x^4 + 16x^3 + 140x^2 + 712x + 1276$; $-5 + \sqrt{3}$

33. Find the vertical, horizontal, and oblique asymptotes, if any, for $f(x) = \frac{4x^3 - 20x^2 - 31x + 55}{x^2 - 4x - 12}$.

Semester Exam Review

For each function, determine any asymptotes, holes, and intercepts. Then graph the function and state its domain.

$$34. g(x) = \frac{(3x-3)(x+2)}{(x-4)(x+3)}$$

35. Discuss the behavior at each point of discontinuity in number 34.

$$36. \text{Graph } f(x) = \frac{x^2+2x-3}{x+1}$$

37. Discuss the behavior at each point of discontinuity in number 36.

$$38. \text{Graph and solve: } x^3 - 2x^2 - 35x < 0.$$

Solve.

$$39. \frac{x}{x-2} + \frac{x+2}{x} > 2$$

$$40. \frac{y}{3} + \frac{y-1}{2} \geq -3$$

$$41. \text{Graph } y = \left(\frac{1}{2}\right)^{x-6}$$

42. Sketch and analyze the graph of $d(x) = -6^x - 4$. Describe its domain, range, intercepts, asymptotes, end behavior, and where the function is increasing or decreasing.

Use the graph of f to describe the transformation that results in the graph of g . Then sketch the graphs of g and f .

$$43. f(x) = 6^x; g(x) = 6^{x+5} - 2$$

44. A shipping company owns a fleet of heavy trucks. If the purchase price of each truck is \$245,000 and its value depreciates by 15 percent per year, what is the value of each truck after 4 years?

45. If the Ramirez family deposits \$5000 in a savings account at 7.5% interest compounded continuously, how much will be in the account after 15 years?

$$46. \text{Evaluate the expression } \log_3 \frac{1}{27}$$

Evaluate each expression.

$$47. \ln\left(\frac{1}{e^2}\right)$$

Semester Exam Review

48. Graph $f(x) = \log_6 x$.

49. Graph the function $f(x) = \log_{\frac{1}{2}}(x + 3)$.

Use the graph of f to describe the transformation that results in the graph of g .

50. $f(x) = \log x$; $g(x) = -\log(x - 6)$

Expand each expression.

51. $\log_7 \frac{5x + 2}{\sqrt[8]{7 - 3x}}$

Condense each expression.

52. $-6 \log_3(x + 1) + 4 \log_3(2x)$

53. $\ln 13 - 7 \ln a - 3 \ln b + 5 \ln c$

Evaluate each logarithm.

54. $\log_{\frac{1}{4}}\left(\frac{1}{2}\right)$

55. $\log_2 \sqrt[7]{32}$

Solve each equation.

56. $\left(\frac{4}{25}\right)^{2x-2} = \left(\frac{2}{5}\right)^{3x+1}$

57. $\log_2(-5x) = \log_2 3 + \log_2(x + 2)$

58. $4^{1x-2} = 3^{5x-5}$

59. $\log(x - 3) = -2 + \log(x + 6)$

60. Solve: $e^{2x} - 6e^x + 8 = 0$

Solve each logarithmic equation.

61. $-13 + 17 \ln 5x = 30$

62. Find the amount of time required to double an amount at 4.26% if the interest is compounded continuously.

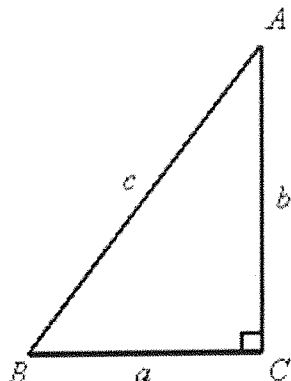
Semester Exam Review

63. The table below shows data on the number of mold colonies growing in a culture on a petri dish.

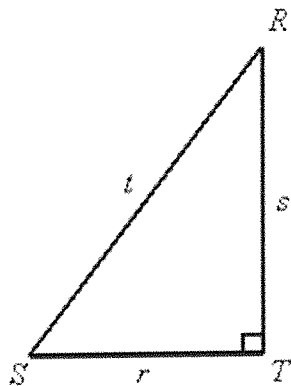
Time (hours)	0	4	8	12	16
Mold Colonies	1	4	12	31	71

- Find an exponential function that models the data.
- Use the model to estimate the time when the mold colony to reach 109.

64. If $c = 18$ and $A = 64^\circ$, find a . Round to the nearest tenth.



65. If $t = 19$ and $r = 10$, find S . Round to the nearest tenth.



66. Change $\frac{1}{13}\pi$ radians to degree measure.

67. Change 160° to radian measure in terms of π .

68. Find the least positive angle measurement that is coterminal with -210° .

69. For a circle of radius 6 feet, find the arc length s intercepted by a central angle of 31° .

70. A circular blade on a saw rotates at 2400 revolutions per minute. Find the angular speed in radians per second?

71. A gear of radius 4 cm turns at 11 revolutions per second. What is the linear velocity of the gear in meters per second?

Name: _____ Class: _____ Date: _____

Semester Exam Review

72. Find the reference angle for 260° .

73. Suppose θ is an angle in the standard position whose terminal side is in Quadrant I and $\tan \theta = \frac{4}{3}$. Find the exact values of the five remaining trigonometric functions of θ .

74. Find the exact value of $\csc \frac{11\pi}{6}$.

75. Find the exact value of $\cos \frac{3\pi}{4}$.

76. Find the exact value of $\sin \frac{7\pi}{6}$.

77. Find the exact value of $\cos \frac{4\pi}{3}$.

78. Find the exact value of $\cot \frac{5\pi}{6}$.

79. If $\tan \theta = \frac{3}{4}$, find $\csc \theta$.

80. You are skiing down a mountain with a vertical height of 1500 feet. The distance from the top of the mountain to the base is 3000 feet. What is the angle of elevation from the base to the top of the mountain?