Semester 2 Final Exam Review

Name_____ Period_____

NOTE: ANY TALKING OR SUSPICIOUS COMMUNICATION DURING OR AFTER THE IN-CLASS FINAL EXAM TEST WILL RESULT IN AN AUTOMATIC GRADE OF 0%.

Multiple Choice. In the blank to the left of the statement or question, write the upper-case letter corresponding to the answer that best completes or answers the statement or question.

_____1. What is the simplified form of $\frac{\sqrt[3]{270x^{20}}}{\sqrt[3]{5x}}$?

(A) $2x\sqrt[3]{3x^6}$ (B) $3x^6\sqrt[3]{2x}$ (C) $\sqrt[3]{135x^{19}}$ (D) $3x\sqrt[3]{135x}$

_____2. $\log\left(\frac{x^3y^2}{3}\right)$ = ___.

(A) 3 log x + 2 log y + log 3
(B) 3 log x – 2 log y – log 3
(C) (3 log x)(2 log y) – log 3
(D) 3 log x + 2 log y – log 3

_____3. If $\log_2 x = 3$, x = ___.

(A) $\frac{3}{\log_2 3}$ (B) 2(3) (C) 2^3 (D) 3^2

_____4. Solve for x: $5x = \sqrt{10 + 15x}$.

(A) $x = -1$ (B) $x = -\frac{2}{5}$ (C) $x = 1$ or $x = -\frac{2}{5}$ (D) $x = 1$

_____5. Solve for x: $\sqrt{10 + 2x} = 5 + x$.

(A) $x = 3, 5$ (B) $x = -1, 3$ (C) $x = 1, -3$ (D) $x = -3, -5$

_____6. If $\left(\frac{1}{2}\right)^x = 17$, $x \approx$ ___.

(A) –8.500 (B) –4.087 (C) –0.245 (D) 4.087

_____7. 4 $\log_5(4x + 1)$ + 5 $\log_5(2x + 6)$ = ___.

(A) $\log_5((4x + 1)^4 + (2x + 6)^5)$
(B) $\log_5 \frac{(4x+1)^4}{(2x+6)^5}$
(C) 20 $\log_5$ [$(4x + 1)(2x + 6)$]
(D) $\log_5$ [$(4x + 1)^4(2x + 6)^5$]

_____8. What is the simplified form of $\sqrt[5]{-32x^{15}}$?

(A) $2x^3$ (B) $-2x^3$ (C) $-2x^{10}$ (D) $2x^{10}$

_____9. Dr. Hartman puts $5000 into an account with interest that is compounded continuously. If the annual rate of interest is 3%, how much money will be in Dr. Hartman's account after 6 years?
(A) $5090.81 (B) $5986.09 (C) $30,913.64 (D) $244,645.36

_____10. What is the solution of the equation $3\sqrt[3]{x+4} = 12$?
(A) 12 (B) 40 (C) 60 (D) 85

_____11. What is the solution of the equation $(2x + 15)^{1/2} - 2 = 3$?
(A) 0 (B) 5 (C) –5 (D) 10

_____12. What is the range of $y = 5(3)^{x-2} - 1$?
(A) $y > 2$ (B) $y > -2$ (C) $y > 1$ (D) $y > -1$ (E) All real numbers

_____13. What is the domain of $y = 5(3)^{x-2} - 1$?
(A) $x > 2$ (B) $x > -2$ (C) $x > 1$ (D) $x > -1$ (E) All real numbers

_____14. What is the range of $y = \log(x - 2) - 1$?
(A) $y > 2$ (B) $y > -2$ (C) $y > 1$ (D) $y > -1$ (E) All real numbers

_____15. What is the domain of $y = \log(x - 2) - 1$?
(A) $x > 2$ (B) $x > -2$ (C) $x > 1$ (D) $x > -1$ (E) All real numbers

_____16. Which of the following is equivalent to $\log_a b = c$?
(A) $a^b = c$ (B) $b^a = c$ (C) $b^c = a$ (D) $a^c = b$

_____17. What is the inverse of the function $y = \ln(x + 3)$?
(A) $y = 3^x - e$ (B) $y = x^3 - e$ (C) $y = e^x - 3$ (D) $y = e^3 - x$

_____18. What is the condensed expression for $3 \log x - \log 2$?
(A) $\log\frac{x^3}{2}$ (B) $\log 2x^3$ (C) $\log 2x^{-3}$ (D) $\log\frac{x^{-3}}{2}$

_____19. What is the solution of $3^x = 45$?
(A) 3.382 (B) 3.417 (C) 3.438 (D) 3.465

_____20. What is the solution of $\log_7(4x + 5) = 2$?
(A) 2 (B) 6 (C) 9 (D) 11

_____21. What are the asymptotes of the graph of $y = \frac{2}{x+18} - 7$?
(A) $x = 18$, $y = 2$ (C) $x = -18$, $y = 7$
(B) $x = -18$, $y = -7$ (D) $x = 2$, $y = -18$

_____22. Simplify the following expression: $\frac{x+3}{x-5} - \frac{x}{x+1}$.
(A) $\frac{3}{2x-6}$ (B) $\frac{9x+3}{(x+1)(x-5)}$ (C) $\frac{3-x}{(x+1)(x-5)}$ (D) $\frac{3}{(x+1)(x-5)}$

_____23. What are all the solutions of the equation $\frac{-6}{x+7} = \frac{x}{2}$?
(A) –3, 4 (B) –4 (C) –3 (D) –3, –4

_____24. What is the product of $\frac{x^2-7x-44}{x^2+6x-16} \bullet \frac{x^2+17x+72}{x^2-2x-99}$?

(A) $\frac{x+9}{x-2}$ (B) $\frac{x-2}{x+4}$ (C) $\frac{x+4}{x-2}$ (D) $\frac{x-11}{x+9}$

_____25. Simplify the following expression: $\left(27a^{-9}\right)^{-\frac{4}{3}}$.

(A) $\frac{1}{81a^{12}}$ (B) $\frac{a^{12}}{81}$ (C) $\frac{81}{a^{12}}$ (D) $81a^{12}$

_____26. Simplify the following expression: $\sqrt{2}+6\sqrt{128}+3\sqrt{8}$.

(A) $9\sqrt{2}$ (B) $55\sqrt{2}$ (C) $55\sqrt{138}$ (D) $9\sqrt{138}$

_____27. Simplify the following expression: $\left(3+\sqrt{5}\right)\left(7+\sqrt{5}\right)$

(A) $26+10\sqrt{5}$ (B) 26 (C) $21+10\sqrt{5}$ (D) $26+\sqrt{5}$

In problems 28 – 30, perform the indicated operation. Let $f(x) = x + 1$ and $g(x) = x - 1$.

_____28. $f(x) + g(x)$

(A) $2x$ (B) $x^2 - 1$ (C) $2x - 2$ (D) $2x^2 - 1$

_____29. $f(x) \bullet g(x)$

(A) $2x^2 - 1$ (B) $2x^2$ (C) $2x^2 + 1$ (D) $x^2 - 1$

_____30. $f(g(x))$

(A) x (B) $x^2 - 1$ (C) $x - 1$ (D) $2x$

_____31. What is the solution of $2(x + 3)^{1/3} - 5 = 1$?

(A) $\frac{1}{24}$ (B) –24 (C) 24 (D) no solution

_____32. Simplify the following expression: $\frac{x^2+12x+35}{x^2+9x+20} \div \frac{x^2-49}{x^2+7x+12}$.

(A) $\frac{x+3}{x-7}$ (B) $\frac{x-7}{x+3}$ (C) $\frac{(x+7)^2(x-7)}{(x+4)^2(x+3)}$ (D) $\frac{(x+4)^2(x+3)}{(x+7)^2(x-7)}$

_____33. What is the asymptote of the graph of $f(x) = 2^x$?

(A) x-axis (B) y-axis (C) $y = 1$ (D) $y = -1$

_____34. Which of the following is equivalent to $\log_b \frac{x}{y}$?

(A) $\log_b x \div \log_b y$ (B) $\log_b x - \log_b y$ (C) $\log_b (x - y)^{1/2}$ (D) $\log_b x + \log_b y$

_____35. The variable x varies inversely with y. When $x = -3$ and $y = -2$, which equation relates x and y?

(A) $\frac{x}{y} = \frac{-3}{-2}$ (B) $xy = 6$ (C) $\frac{x}{y} = \frac{3}{2}$ (D) $x = 6y$

_____36. The variable z varies jointly with x and y. When $x = 5$ and $y = 2$, $z = 10$. Which equation relates x, y, and z?

(A) $z = xy$ (B) $z = \frac{1}{10}xy$ (C) $z = \frac{x}{y}$ (D) $z = 10xy$

_____37. What are the solutions of the equation $x = \frac{2}{x-1}$?

(A) –2, 1 (B) 2, 1 (C) –1, 2 (D) –1, –2

_____38. What is the sum of $\frac{x+1}{x} + \frac{x}{2}$?

(A) $\frac{x(x+1)}{2x}$ (B) $\frac{x^2+2x+2}{x+2}$ (C) $\frac{x^2+x+2}{x+2}$ (D) $\frac{x^2+2x+2}{2x}$

_____39. What is the simplified form of the complex fraction $\frac{\frac{1}{x}}{\frac{x}{x^2+1}}$?

(A) $\frac{x^2+1}{x^2}$ (B) $\frac{1}{x^2}$ (C) 2 (D) $\frac{x^2+1}{2x}$

_____40. Which function is the inverse of $f(x) = -\frac{1}{5}x + 8$?

(A) $f^{-1}(x) = -\frac{1}{5}x - 8$ (C) $f^{-1}(x) = 5x + 40$

(B) $f^{-1}(x) = -5x + 40$ (D) $f^{-1}(x) = -5x - 40$

_____41. Which function is the inverse of $f(x) = \frac{1}{4}x^3 + 1$?

(A) $f^{-1}(x) = \sqrt[3]{x-1}$ (C) $f^{-1}(x) = \sqrt[3]{4x-1}$

(B) $f^{-1}(x) = \sqrt[3]{4x-4}$ (D) $f^{-1}(x) = \sqrt[3]{4x+4}$

_____42. Which is the domain and range of $y = 5\sqrt[8]{x-1} + 3$?

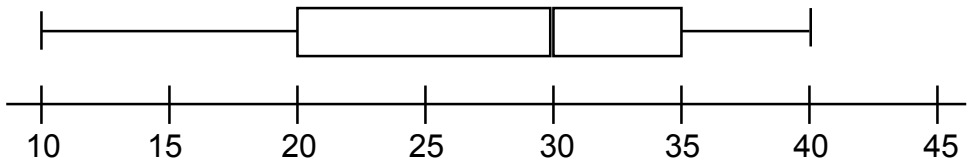
(A) $x \geq 1$, $y \geq 3$ (C) $x \geq -1$, $y \leq -3$

(B) $x \geq 1$, $y \leq 3$ (D) $x \leq 1$, $y \geq 3$

_____43. What is the simplified form of $\sqrt[5]{\frac{x^5}{y^{15}}}$?

(A) $\frac{x}{y^3}$ (B) $\frac{x^5}{y^{15}}$ (C) $\frac{x}{y^{15}}$ (D) $\sqrt[5]{\frac{x}{y^3}}$

For questions 44 – 46, refer to the following box-and-whisker plot.

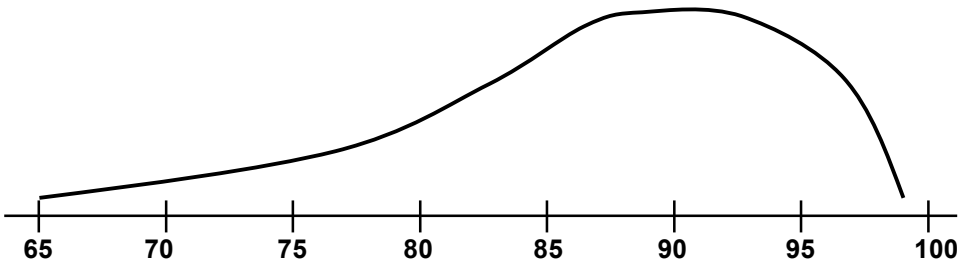


_____44. What is Q1?
(A) 5 (B) 10 (C) 15 (D) 30

_____45. What is the interquartile range?
(A) 5 (B) 10 (C) 15 (D) 30

_____46. What is the range?
(A) 5 (B) 10 (C) 15 (D) 30

_____47. What kind of distribution is indicated below?



(A) Normal (B) Negatively skewed (C) Positively skewed (D) Not skewed

_____48. $\log_b y - \log_b b =$ ___.

(A) $\log_b \frac{b}{y}$ (B) $\log_b (y - b)$ (C) $\log_b \frac{y}{b}$ (D) $\log_{2b} \frac{y}{b}$

_____49. $\log_n \sqrt[6]{\frac{4x^9}{z^8}} =$ ___.

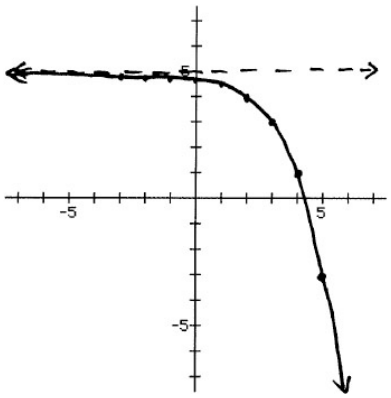
(A) $\log_n 4 + 9 \log_n x - 8 \log_n z$ (C) $\frac{1}{6}\log_n 4 + \frac{3}{2}\log_n x + \frac{4}{3}\log_n z$

(B) $\frac{1}{6}\log_n 4 - \frac{3}{2}\log_n x - \frac{4}{3}\log_n z$ (D) $\frac{1}{6}\log_n 4 + \frac{3}{2}\log_n x - \frac{4}{3}\log_n z$

_____50. $4 \log_m x - 7 \log_m q^2 =$ ___.

(A) $\log_m \frac{x^4}{2q^7}$ (B) $\log_m \frac{4x}{7q^2}$ (C) $\log_m \frac{x^4}{q^9}$ (D) $\log_m \frac{x^4}{q^{14}}$

_____51. Which function is graphed at right?



(A) $y = \frac{1}{2}\left(2^{x-1}\right) + 5$

(B) $y = -\frac{1}{2}\left(2^{x-1}\right) + 5$

(C) $y = \frac{1}{2}\left(2^{x-5}\right) + 2$

(D) $y = -\frac{1}{2}\left(2^{x-5}\right) + 2$

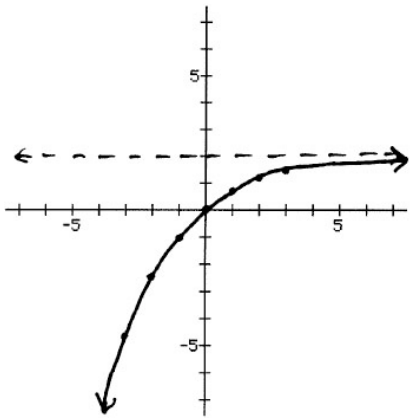
_____52. Which function is graphed at right?

(A) $y = 3\left(\frac{2}{3}\right)^{x+1} + 2$

(B) $y = -3\left(\frac{2}{3}\right)^{x+1} + 2$

(C) $y = 3\left(\frac{2}{3}\right)^{x-2} - 1$

(D) $y = -3\left(\frac{2}{3}\right)^{x-2} - 1$



_____53. Ms. Buckner buys a car for $25000. The value *A* of the car depreciates (decreases) by 15% each year. If *t* represents the number of years, which function models the scenario?
(A) $A = 25000(1.15)^t$ (B) $A = 25000(0.85)^t$ (C) $A = 25000t^{1.15}$ (D) $A = 25000t^{0.85}$

_____54. Mr. Geist buys a painting for $300000. The value *A* of the painting increases by 20% each year. If *t* represents the number of years, which function models the scenario?
(A) $A = 300000(1.2)^t$ (B) $A = 300000(0.8)^t$ (C) $A = 300000t^{1.2}$ (D) $A = 300000t^{0.8}$

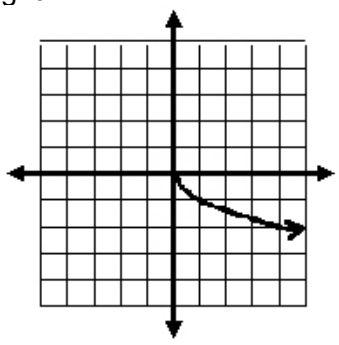
_____55. Mrs. Bushhousen puts $1000 into an account that pays an annual rate of interest of 8% and is compounded continuously. How many years will it take for Mrs. Bushhousen's investment to triple?
(A) 12 (B) 13 (C) 14 (D) 15

_____56. Which of the following models does not represent inverse variation?
(A) $xy = 5$ (B) $x = 2y$ (C) $x = \frac{2}{y}$ (D) $y = \frac{2}{x}$

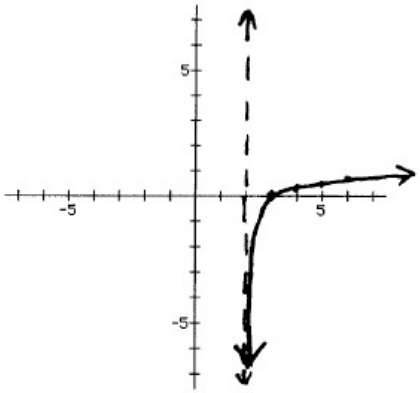
_____57. Solve the following equation: $\frac{5}{x+1} + \frac{x}{x^2-1} = \frac{1}{x-1}$
(A) 1 (B) 0 (C) $\frac{5}{6}$ (D) $y = \frac{6}{5}$

_____58. A set of grades has a mean of 75 with a standard deviation of 2.5. The grades are normally distributed. What grade is 2 standards deviations above the mean?
(A) 70 (B) 72.5 (C) 77.5 (D) 80

_____59. What are the domain and range of the graph shown at right?
(A) Domain: All real numbers
Range: All real numbers
(B) Domain: $x \le 0$
Range: $y \ge 0$
(C) Domain: $x \le 0$
Range: $y \le 0$
(D) Domain: $x \ge 0$
Range: $y \le 0$



_____60. Which function is graphed at right?



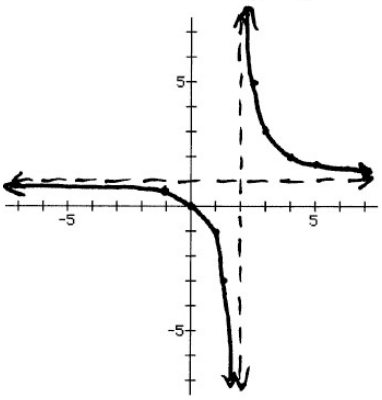
(A) $y = \log_{10}(x + 2)$

(B) $y = \log_{10}(x - 2)$

(C) $y = \log_{10}x + 2$

(D) $y = \log_{10}x - 2$

_____61. Which function is graphed at right?



(A) $y = \dfrac{2}{x+2} - 1$

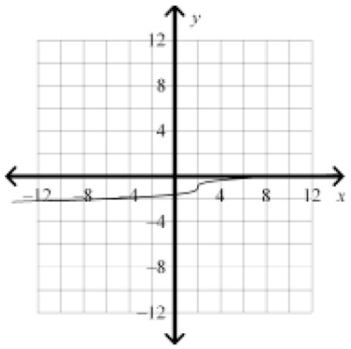
(B) $y = \dfrac{2}{x+1} + 2$

(C) $y = \dfrac{2}{x-2} + 1$

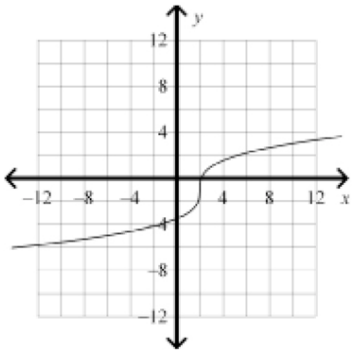
(D) $y = \dfrac{2}{x-1} - 2$

_____62. Which graphed represents $y = \dfrac{1}{2}\sqrt[3]{x-2} + 1$?

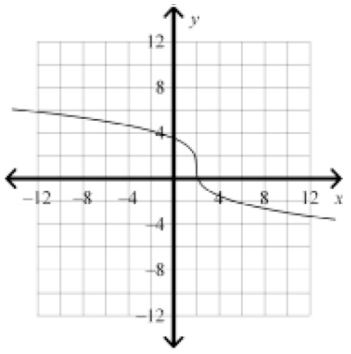
A)



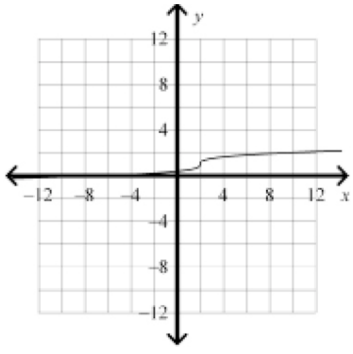
C)



B)



D)



_____63. Simplify the following expression: $\dfrac{2x^2 - 3x - 2}{3x^2 - x - 10}$.

(A) $\dfrac{2x+1}{3x-5}$ (B) $\dfrac{2x-1}{3x-5}$ (C) $\dfrac{2x-1}{3x+5}$ (D) $\dfrac{2x+1}{3x+5}$

_____64. Solve the following equation: $4 \log_4 x + \log_4 81 = 2$.

(A) $\frac{2}{3}$ (B) $\pm\frac{2}{3}$ (C) 5 (D) ± 5

_____65. Simplify completely: $\sqrt[4]{10x^5} \bullet \sqrt[4]{3240x^4}$

(A) $78x^8\sqrt[4]{25x}$

(B) $3x^4\sqrt[4]{400x^5}$

(C) $6x^2\sqrt[4]{25x}$

(D) $30x^2\sqrt[4]{x}$