

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

- 1) $\log_{112} 8 + \log_{112} 14$ 1) _____
 A) 14 B) 1 C) 8 D) 112

Change the logarithmic expression to an equivalent expression involving an exponent.

- 2) $\ln \frac{1}{e^4} = -4$ 2) _____
 A) $\left(\frac{1}{e^4}\right)^{-4} = e$ B) $\left(\frac{1}{e^4}\right)^e = -4$ C) $-4e = \frac{1}{e^4}$ D) $e^{-4} = \frac{1}{e^4}$

Answer the question.

- 3) Define the number e. 3) _____
 A) The number that the expression, $\left(1 + \frac{1}{n}\right)^n$, approaches as $n \rightarrow \infty$.
 B) The number approximately equal to 2.72.
 C) The number defined by $e = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$ in Calculus.
 D) All of the above.

Solve the problem.

- 4) If $7^x = 4$, what does 7^{-3x} equal? 4) _____
 A) $\frac{1}{12}$ B) 64 C) -64 D) $\frac{1}{64}$

Find the inverse. Determine whether the inverse represents a function.

- 5) $\{(6, -7), (-2, -6), (-4, -5), (-6, -4)\}$ 5) _____
 A) $\{(-7, 6), (-6, -2), (-5, -4), (-4, -6)\}$; not a function
 B) $\{(-6, -7), (-7, -4), (6, -2), (-6, -5)\}$; not a function
 C) $\{(-7, 6), (-6, -2), (-5, -4), (-4, -6)\}$; a function
 D) $\{(-6, -7), (-4, -4), (6, -4), (-6, -5)\}$; a function

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

For the given functions f and g, find the requested composite function value.

- 6) $f(x) = \sqrt{x+3}$; $g(x) = 3x$; Find $(f \circ g)(2)$. 6) _____

Find the indicated composite for the pair of functions.

- 7) $(g \circ f)(x)$: $f(x) = -2x + 8$, $g(x) = 4x + 7$ 7) _____

Find functions f and g so that the composition of f and g is H.

- 8) $H(x) = (5 - 2x^3)^2$ 8) _____

Find the domain of the composite function $f \circ g$.

- 9) $f(x) = x + 7$; $g(x) = \frac{7}{x+2}$ 9) _____

10) $f(x) = \sqrt{x}$; $g(x) = 4x + 24$

10) _____

Indicate whether the function is one-to-one.

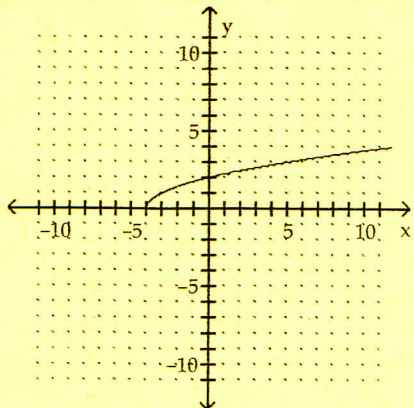
11) $\{(-8, -7), (-7, -7), (-6, -3), (-5, 1)\}$

11) _____

The graph of a one-to-one function f is given. Draw the graph of the inverse function f^{-1} as a dashed line or curve.

12) $f(x) = \sqrt{x+4}$

12) _____



The function f is one-to-one. Find its inverse.

13) $f(x) = \sqrt[3]{x+7}$

13) _____

14) $f(x) = \frac{3x+7}{8}$

14) _____

Decide whether or not the functions are inverses of each other.

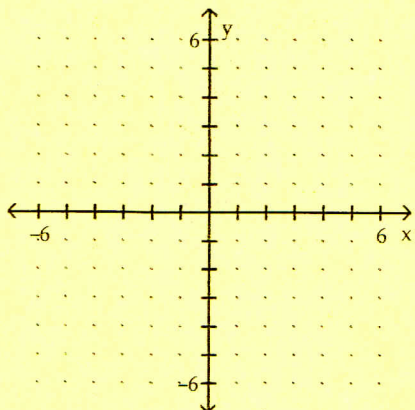
15) $f(x) = 5x + 4$; $g(x) = \frac{1}{5}(x - 4)$

15) _____

Use transformations to graph the function. Determine the domain, range, and horizontal asymptote of the function.

16) $f(x) = 4(x - 3)$

16) _____



Solve the equation.

17) $2^{7-3x} = \frac{1}{4}$

17) _____

18) $(e^x)^x \cdot e^{45} = e^{14x}$

18) _____

Change the exponential expression to an equivalent expression involving a logarithm.

19) $3^{-2} = \frac{1}{9}$

19) _____

20) $e^x = 12$

20) _____

Change the logarithmic expression to an equivalent expression involving an exponent.

21) $\log_{\pi} 37 = x$

21) _____

Find the exact value of the logarithmic expression.

22) $\log_8 \frac{1}{512}$

22) _____

23) $\log_5 \sqrt{5}$

23) _____

24) $\ln e^9$

24) _____

25) $\log_6 36$

25) _____

Find the domain of the function.

26) $f(x) = \log_{10} \left(\frac{x+8}{x-3} \right)$

26) _____

27) $f(x) = \log_{1/2}(x+4)$

27) _____

Solve the equation.

28) $\log_8 (x^2 - 7x) = 1$

28) _____

29) $\log_5 (x+4) = 3$

29) _____

Find the value of the expression.

30) Let $\log_b A = 3$ and $\log_b B = -2$. Find $\log_b AB$.

30) _____

31) Let $\log_b A = 5$ and $\log_b B = -2$. Find $\log_b \sqrt[5]{AB}$.

31) _____

Write as the sum and/or difference of logarithms. Express powers as factors.

32) $\log_{15} \frac{4\sqrt{x}}{y}$

32) _____

33) $\log_5 \frac{\sqrt[8]{m} \sqrt[9]{n}}{k^2}$

33) _____

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

34) $\log_{5.4} 239$

34) _____

Express as a single logarithm.

35) $2 \log_c m - \frac{5}{3} \log_c n + \frac{1}{4} \log_c j - 5 \log_c k$ 35) _____

36) $(\log_a x - \log_a y) + 6 \log_a z$ 36) _____

Solve the problem.

37) The formula $P = 14.7e^{-0.21x}$ gives the average atmospheric pressure, P , in pounds per square inch, at an altitude x , in miles above sea level. Find the average atmospheric pressure for an altitude of 2.3 miles. Round your answer to the nearest tenth. 37) _____

38) $\text{pH} = -\log_{10}[\text{H}^+]$ Find the pH if the $[\text{H}^+] = 5.5 \times 10^{-1}$. 38) _____

39) The formula $D = 6e^{-0.04h}$ can be used to find the number of milligrams D of a certain drug in a patient's bloodstream h hours after the drug has been given. When the number of milligrams reaches 4, the drug is to be given again. What is the time between injections? 39) _____

40) A college student earned \$7300 during summer vacation working as a waiter in a popular restaurant. The student invested part of the money at 9% and the rest at 7%. If the student received a total of \$585 in interest at the end of the year, how much was invested at 9%? 40) _____

41) The manager of a coffee shop has one type of coffee that sells for \$6 per pound and another type that sells for \$9 per pound. The manager wishes to mix 40 pounds of the \$9 coffee to get a mixture that will sell for \$7 per pound. How many pounds of the \$6 coffee should be used? 41) _____

42) Two trains leave a train station at the same time. One travels east at 10 miles per hour. The other train travels west at 8 miles per hour. In how many hours will the two trains be 72 miles apart? 42) _____

Simplify the expression. Assume that all variables are positive when they appear.

43) $\sqrt{\frac{75x^2y}{49}}$ 43) _____

44) $\sqrt[3]{27y} - \sqrt[3]{128y}$ 44) _____

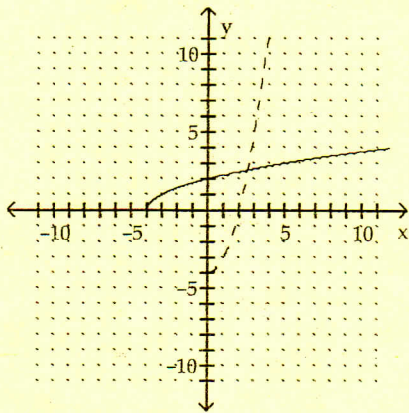
Find the real solutions of the equation.

45) $\sqrt[3]{2x+5} = -3$ 45) _____

Answer Key

Testname: PC REVIEW 4.1-4.5

- 1) B
- 2) D
- 3) D
- 4) D
- 5) C
- 6) 3
- 7) $-8x + 39$
- 8) $f(x) = x^2$; $g(x) = 5 - 2x^3$
- 9) $\{x \mid x \neq -2\}$
- 10) $\{x \mid x \geq -6\}$
- 11) No
- 12)

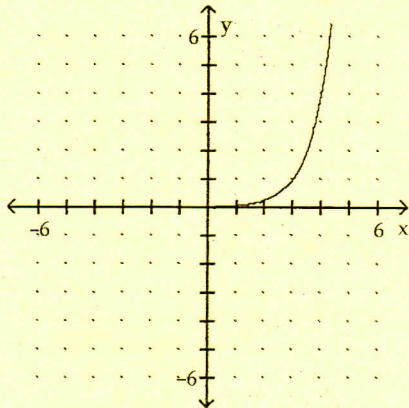


13) $f^{-1}(x) = x^3 - 7$

14) $f^{-1}(x) = \frac{8x - 7}{3}$

15) Yes

16)



domain of f : $(-\infty, \infty)$; range of f : $(0, \infty)$

horizontal asymptote: $y = 0$

- 17) $\{3\}$
- 18) $\{5, 9\}$
- 19) $\log_3 \frac{1}{9} = -2$
- 20) $\ln 12 = x$
- 21) $\pi^x = 37$

- 22) -3
- 23) $\frac{1}{2}$
- 24) 9
- 25) 2
- 26) $(-\infty, -8) \cup (3, \infty)$
- 27) $(-4, \infty)$
- 28) $\{8, -1\}$
- 29) $\{121\}$
- 30) 1
- 31) 0.600
- 32) $\log_{15} 4 + \frac{1}{2} \log_{15} x - \log_{15} y$
- 33) $\frac{1}{8} \log_5 m + \frac{1}{9} \log_5 n - 2 \log_5 k$
- 34) 3.247
- 35) $\log_c \frac{m^2 j^{1/4}}{n^{5/3} k^5}$
- 36) $\log_a \frac{xz^6}{y}$
- 37) 9.1 lb/in²
- 38) 0.26
- 39) 10.14 hrs
- 40) \$3700
- 41) 80 lb
- 42) 4 hr
- 43) $\frac{5x\sqrt{3y}}{7}$
- 44) $3\sqrt[3]{y} - 4\sqrt[3]{2y}$
- 45) $\{-16\}$

