

Name \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question( 5 pts each).  
 NO CALCULATORS OF ANY KIND ALLOWED.

Solve the problem.

1) If \$3500 is invested in an account that pays interest compounded continuously, how long will it take to grow to \$7000 at 5%? 1) \_\_\_\_\_

- A)  $\ln(.05)/2$  years      B) 13.0 years      C)  $\ln(2)/.05$  years      D)  $-\ln(2)/.05$  years

Solve the equation.

2)  $\log_6(2x + 7) = \log_6(2x + 4)$  2) \_\_\_\_\_

- A) 3      B)  $\emptyset$       C)  $\frac{11}{3}$       D) 0

Solve the equation. Express irrational answers in exact form.

3)  $\ln x + \ln(x + 7) = -1$  3) \_\_\_\_\_

- A)  $\frac{-7 + \sqrt{49 + 4e^{-1}}}{2}$       B)  $\frac{-7 + 2\sqrt{49 + e^{-1}}}{2}$   
 C)  $\frac{-7 - \sqrt{49 + 4e^{-1}}}{2}$       D)  $-7 + \sqrt{49 + 4e^{-1}}$

Find the indicated composite for the pair of functions.

4)  $(f \circ g)(x)$ :  $f(x) = \frac{1}{x - 8}$ ,  $g(x) = \frac{8}{3x}$  4) \_\_\_\_\_

- A)  $\frac{8x - 64}{3x}$       B)  $\frac{1x}{8 - 24x}$       C)  $\frac{3x}{8 + 24x}$       D)  $\frac{3x}{8 - 24x}$

5)  $(g \circ f)(x)$ :  $f(x) = 4x^2 + 3x + 5$ ,  $g(x) = 3x - 7$  5) \_\_\_\_\_

- A)  $4x^2 + 9x + 8$       B)  $4x^2 + 3x - 2$       C)  $12x^2 + 9x + 8$       D)  $12x^2 + 9x + 22$

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

6)  $f(x) = 9x + 4$ ;  $g(x) = \frac{x}{9} - 4$  6) \_\_\_\_\_

- A) No      B) Yes

Solve the equation.

7)  $92x \cdot 27(3 - x) = \frac{1}{9}$

7) \_\_\_\_\_

A)  $x = -8$

B)  $x = -11$

C)  $x = 10$

D)  $x = \frac{9 + \sqrt{87}}{6}$  and  $x = \frac{9 - \sqrt{87}}{6}$

8)  $4^{(5 - 3x)} = \frac{1}{256}$

8) \_\_\_\_\_

A)  $\frac{1}{64}$

B) 3

C) 128

D) -3

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

9)  $32^{1/5} = 2$

9) \_\_\_\_\_

A)  $\log_1 32 = \frac{1}{5}$

B)  $\log_{32} 2 = \frac{1}{5}$

C)  $\frac{\log_5 2}{\log_1 32} = 32$

D)  $\log_2 32 = \frac{1}{5}$

Solve the equation.

10)  $(\log_2 x)^2 = -\log_2 x$

10) \_\_\_\_\_

A)  $x=1$

B)  $x=1, x=1/2$

C)  $x=1, x=2$

D)  $x=2$

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

11)  $x^{\sqrt{5}} = \pi$

11) \_\_\_\_\_

A)  $x = \log_{\pi} \sqrt{5}$

B)  $\sqrt{5} = \log_{\pi} x$

C)  $x = \log_{\sqrt{5}} \pi$

D)  $\sqrt{5} = \log_x \pi$

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

12)  $\log_4 x = 3$

12) \_\_\_\_\_

A)  $4^x = 3$

B)  $x^3 = 4$

C)  $3^4 = x$

D)  $4^3 = x$

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

13) \_\_\_\_\_

A)  $x^{\pi} = 37$

B)  $\pi^x = \frac{1}{37}$

C)  $\pi^x = 37$

D)  $37^x = \pi$

Solve the problem.

14) The pH of a chemical solution is given by the formula

14) \_\_\_\_\_

$$\text{pH} = -\log_{10}[\text{H}^+]$$

where  $[\text{H}^+]$  is the concentration of hydrogen ions in moles per liter.

Find the pH if the  $[\text{H}^+] = 10^{-7}$ .

A) 6.96

B) -7

C) 7.96

D) 7

Solve the equation.

15)  $\log_x \left( \frac{27}{64} \right) = 3$

15) \_\_\_\_\_

A)  $\frac{4}{3}$

B)  $\frac{3}{4}$

C) 27

D) 3

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

16)  $\log_{17} \sqrt{\frac{xy}{6}}$

16) \_\_\_\_\_

A)  $\frac{1}{2} \log_{17} x + \frac{1}{2} \log_{17} y - \frac{1}{2} \log_{17} 6$

B)  $\frac{1}{2} \log_{17} x \cdot \frac{1}{2} \log_{17} y \div \frac{1}{2} \log_{17} 6$

C)  $\frac{1}{2} \log_{17} xy - \frac{1}{2} \log_{17} 6$

D)  $\frac{1}{2} \log_{17} x + \frac{1}{2} \log_{17} y - \log_{17} 6$

Express as a single logarithm.

17)  $3 \log_b m - \log_b n$

17) \_\_\_\_\_

A)  $\log_b (m^3 - n)$

B)  $\log_b m^3 \div \log_b n$

C)  $\log_b \frac{3m}{n}$

D)  $\log_b \frac{m^3}{n}$

Solve the equation.

18)  $\log_x(9)=2$

18) \_\_\_\_\_

A)  $x=0$

B)  $x=3, x=-3$

C)  $x=-3$

D)  $x=3$

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

19)  $\log_{28} 4 + \log_{28} 7$

19) \_\_\_\_\_

A) 4

B) 28

C) 1

D) 7

Find the value of the expression.

20) Let  $\log_b A = 4$  and  $\log_b B = -3$ . Find  $\log_b AB$ .

20) \_\_\_\_\_

A) 1

B) 7

C) 12

D) -12

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

21)  $\log_4 24 - \log_4 6$

21) \_\_\_\_\_

A) 24

B) 4

C) 1

D) 6