

100 pts

Glascoc
Spring 2014

MAT 120/122 T6
Ch 10

Name Key
Class Time _____

MULTIPLE CHOICE: Please circle the entire answer

X } 1. Use the compound interest formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$ to find the accumulated value of an investment of \$30,000 at 5% compounded monthly for 10 years.

- a) \$50,251.79
- b) \$49,410.28**
- c) \$31,273.70
- d) \$29,597.48

$$A = 30000\left(1 + \frac{0.05}{12}\right)^{(12 \cdot 10)} \approx 49410.28$$

B } 2. Find the inverse of the one-to-one function $f(x) = (x+9)^3$ Show work for full credit.

- a) $f^{-1}(x) = \sqrt[3]{x-9}$
- b) $f^{-1}(x) = \sqrt[3]{x} - 9$**
- c) $f^{-1}(x) = \sqrt[3]{x} + 9$
- d) $f^{-1}(x) = \sqrt[3]{x+9}$

$$\sqrt[3]{x} = \sqrt[3]{(y+9)^3}$$

$$\sqrt[3]{x} = y + 9$$

$$y = \sqrt[3]{x} - 9$$

X } 3. Write the equation in its equivalent logarithmic form: $\sqrt[4]{2401} = 7$

- a) $\log_{2401} 4 = \frac{1}{7}$
- b) $\log_{2401} 7 = \frac{1}{4}$**
- c) $\log_7 2401 = 4$
- d) $\log_7 2401 = \frac{1}{4}$

$$(2401)^{\frac{1}{4}} = 7 \qquad \log_{2401}(7) = \frac{1}{4}$$

A } 4. Evaluate the expression without using a calculator: $\log_2 \frac{1}{32}$ (show work)

- a) -5**
- b) $\frac{1}{5}$
- c) 16
- d) -4

$$\log_2(2^{-5})$$

X } 5. Find the domain of the logarithmic function: $f(x) = \log(x+7)$

- a) $(7, \infty)$
- b) $(-7, \infty)$**
- c) $(-\infty, 7) \cup (7, \infty)$
- d) $(-\infty, 0) \cup (0, \infty)$

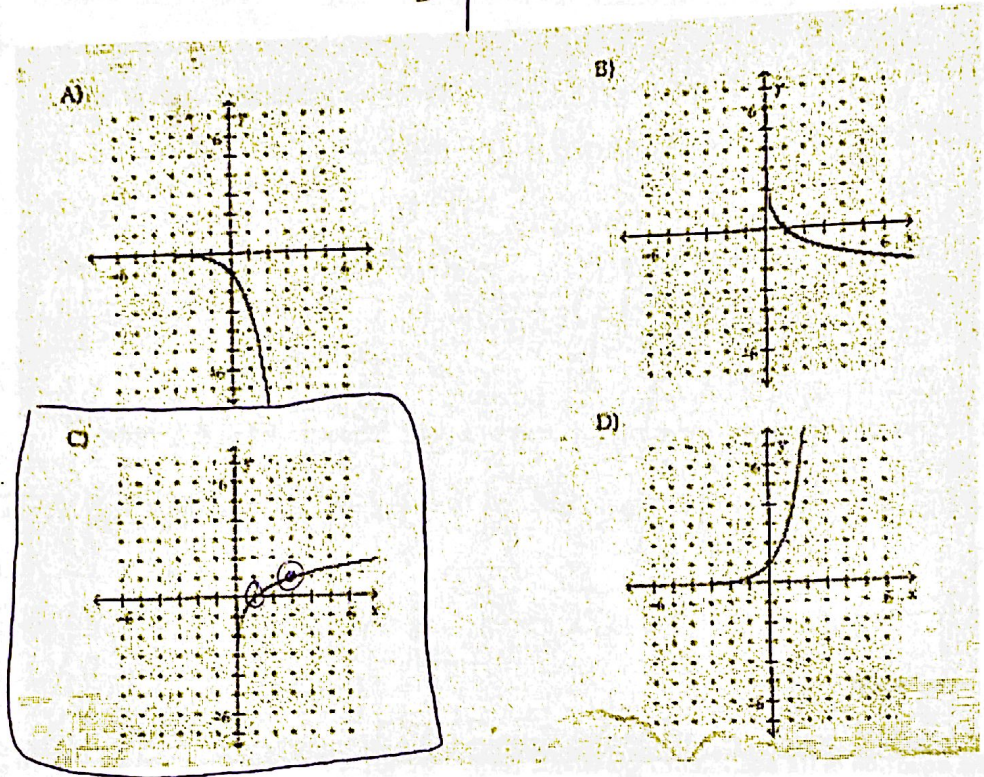
$$x+7 > 0$$

$$x > -7$$

6. Graph the function: $y = \log_3 x$

x	y
1	0
3	1

C



7. Use properties of logarithms to expand the expression as much as possible and simplify where possible, without using a calculator: $\log_2 \left(\frac{\sqrt{y}}{8} \right)$

A

- a) $\frac{1}{2} \log_2 y - 3$
- b) $\log_2 \sqrt{y} - 3 \log_2 2$
- c) $\log_2 \sqrt{y} - \log_2 8$
- d) $\frac{1}{2} \log_2 y - \log_2 8$

$\log_2 \sqrt{x} - \log_2 8$ $\frac{1}{2} \log_2 x - 3$

8. Solve the exponential using a natural log: $2^{x-7} = 6$
Express the solution set in terms of natural logarithms (leave exact using natural logs)

- a) $\frac{\ln 2}{\ln 6} + \ln 7$
- b) $\frac{\ln 6}{\ln 2} - 7$
- c) $\frac{\ln 6}{\ln 2} + 7$
- d) $\ln 6 - \ln 2 - \ln 7$

$(x-7) \ln 2 = \ln 6$

$x-7 = \frac{\ln 6}{\ln 2}$ $x = \frac{\ln 6}{\ln 2} + 7$

f15

9. Solve the logarithmic equation: $\log_3(x+1) + \log_3(x-5) = 3$ (show work for full credit)

a) {8}

b) {9}

c) {-4}

d) {8, -4}

fs

$$\log_3(x^2 - 4x - 5) = 3$$

$$3^3 = x^2 - 4x - 5$$

$$0 = x^2 - 4x - 32$$

$$0 = (x-8)(x+4)$$

$$x = 8 \quad x = -4$$

10. The value of a particular investment follows a pattern of exponential growth. ($A = Pe^{rt}$) In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 4100e^{0.066t}$. When will the account be worth \$5703? (show work!)

a) 2007

b) 2004

c) 2005

d) 2006

fs

$$\frac{5703}{4100} = \frac{4100e^{0.066t}}{4100}$$

$$\frac{\ln\left(\frac{5703}{4100}\right)}{0.066} = \frac{0.066t}{0.066}$$

$$t \approx 5$$

OPEN ENDED QUESTIONS: Show ALL work on this test and CIRCLE your final answer.

11. If $f(x) = 5x - 7$, find $f^{-1}(x)$. Show all work for full credit.

fs

$$x = 5y - 7$$

$$\frac{x+7}{5} = \frac{5y}{5}$$

$$y = \frac{x+7}{5}$$

$$f^{-1}(x) = \frac{x+7}{5}$$

12. $f(x) = 3x + 1$ and $g(x) = 2 - 4x^2$ find $(f(g(2)))$

fs

$$g(2) = 2 - 4(2)^2$$

$$= 2 - 16$$

$$= -14$$

$$f(-14) = 3(-14) + 1$$

$$= -42 + 1$$

$$= -41$$

20

+5

13. Write as a single logarithm whose coefficient is 1:

$$4\log_b x + \frac{1}{2}\log_b y$$

$$\log_b x^4 + \log_b \sqrt{y} \rightarrow \boxed{\log_b (x^4 \sqrt{y})}$$

~~+5~~
+16

14. Evaluate each expression in the following without using a calculator (show all work), then find the overall value.

$$+2 \quad +2 \quad +2 \quad +2 \quad +2 \quad +2$$

$$(\log_7 49 + \log_{10} 10000 - \log_7 1 + e^{\ln 8} + 2\log_4 4) \cdot \log_{25} 5$$

$$\log_7 49 = 2$$

$$\log_{10} 10,000 = 4$$

$$\log_7 1 = 0$$

$$e^{\ln 8} = 8$$

$$2\log_4 4 = 2$$

$$\log_{25} 5 = \frac{1}{2}$$

$$(2+4+0+8+2) \cdot \frac{1}{2}$$

$$16 \cdot \frac{1}{2}$$

$$\boxed{8}$$

+4

15. Solve $3^{1-2x} = \frac{1}{81}$ Show work to solve for credit. Leave answer exact.

+5

$$3^{1-2x} = 3^{-4}$$

$$1-2x = -4$$

$$-2x = -5$$

$$\boxed{x = \frac{5}{2}}$$

+6 16. Solve $\log_2(x+2) - \log_2(x-5) = 3$. Show all algebra work. Leave answer exact.

$$\log_2 \left(\frac{x+2}{x-5} \right) = 3$$

$$(x-5) 2^3 = \frac{x+2}{x-5} (x-5)$$

$$8x - 40 = x + 2$$

$$7x = 42$$

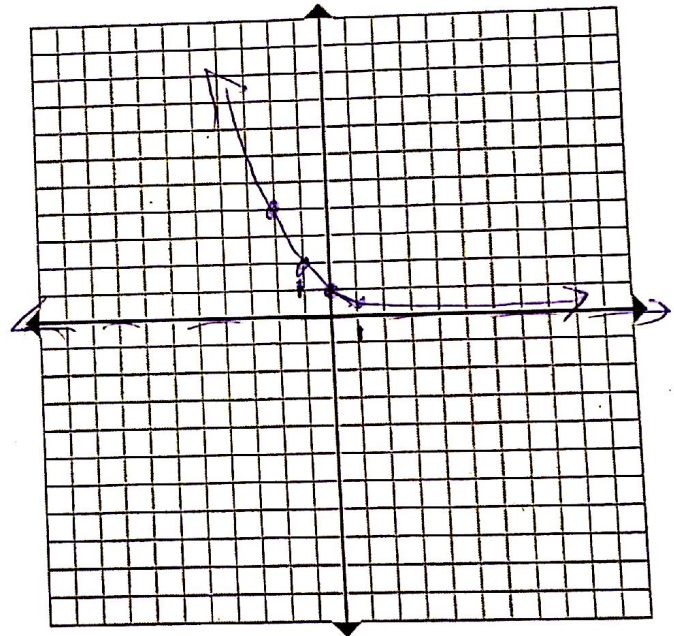
$$\boxed{x = 6}$$

17. Graph $f(x) = \left(\frac{1}{2}\right)^x$

*Label your axes to show the values you are counting by on your x and y axes.

x	y
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
-1	2
-2	4

+4



+2 Domain: $(-\infty, \infty)$

+2 Range: $(0, \infty)$