

MRS22 – Algebra 2/Trigonometry  
Exam 1 Review Sheet

*Topics:*

- Exponential Functions
- Solving Exponential Equations
- The Inverse of an Exponential Function (Logarithmic Function)
- Using the Properties of Logarithms
- Solving Logarithmic Equations
- The Natural Logarithmic Function (ln) and the Number  $e$
- Solving Exponential Equations using Logarithms
- Applications of Exponential and Logarithmic Functions
- Exponential Growth and Decay

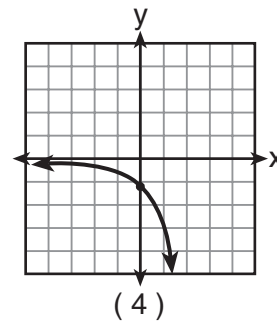
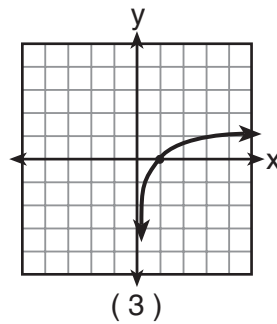
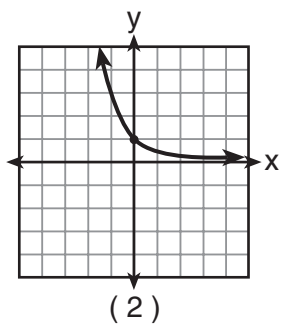
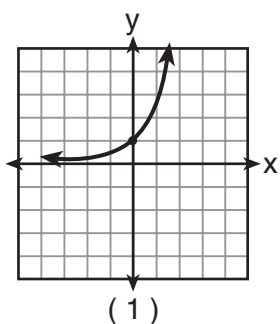
Be sure to thoroughly prepare for the exam by reviewing (and re-doing) problems in your class notes and homework assignments.

Note that exams are **cumulative**, meaning that some questions on this exam will cover topics that were tested on previous exams.

**Graphing calculators** will be provided during this exam.

*Practice Problems:*

1. If  $\ln 5 = x$  and  $\ln 8 = y$ , express  $\ln \sqrt{\frac{25}{8}}$  in terms of  $x$  and  $y$ .
2. Which graph represents the inverse of the equation  $y = 3^x$ ?



3. If  $\log 30 = b$ , then  $(b-1)^2$  is equivalent to  
 (1)  $(\log 29)^2$                       (2)  $(\log 3)^2$                       (3)  $2(\log 30 - 1)$                       (4)  $\log 899$
4. If  $\log_5 x = 2$ , what is the value of  $\sqrt{x}$ ?  
 (1) 25                      (2)  $2^{\frac{2}{5}}$                       (3) 5                      (4)  $\sqrt{5}$
5. If  $\log_x 2 = \frac{1}{3}$ , what is the value of  $x$ ?  
 (1)  $2\frac{1}{3}$                       (2) 8                      (3)  $\sqrt[3]{2}$                       (4) 4
6. Solve algebraically for  $z$ :  $27^{2z-8} = \left(\frac{1}{9}\right)^{3z}$
7. Solve for  $x$ :  $\log_3(7x+4) - \log_3 2 = 2 \log_3 x$
8. Solve for  $x$ :  $2 \log_2 x - \log_2(x-1) = 3$

9. The magnitude ( $R$ ) of an earthquake is related to its intensity ( $I$ ) by  $R = \log\left(\frac{I}{T}\right)$ , where  $T$  is the threshold below which the earthquake is not noticed. If the intensity is doubled, its magnitude can be represented by
- (1)  $2(\log I - \log T)$                       (3)  $\log I - \log T$   
 (2)  $\log 2 + \log I - \log T$                 (4)  $2 \log I - \log T$
10. The expression  $\log \frac{x^n}{\sqrt{y}}$  is equivalent to
- (1)  $n \log x - 2 \log y$             (2)  $n \log x - \frac{1}{2} \log y$             (3)  $\log(nx) - \log(2y)$             (4)  $\log(nx) - \log\left(\frac{1}{2}y\right)$
11. The expression  $\log a + \frac{1}{2} \log b$  is equivalent to
- (1)  $\log(a + \sqrt{b})$             (2)  $(\log a)\left(\frac{1}{2} \log b\right)$             (3)  $\log \sqrt{ab}$                             (4)  $\log a \sqrt{b}$
12. Express  $\log x$  in terms of  $\log a$ ,  $\log b$ , and  $\log c$ :    (a)  $x = \frac{ab}{c}$                                     (b)  $x = \frac{\sqrt{ab}}{c^2}$
13. Solve for  $x$ :  $\log_x 16 = 2$
14. Solve for  $x$  to the nearest tenth:
- (a)  $12^x = 215$             (b)  $3^{2x} = 67.8$                             (c)  $7^x + 4 = 21$             (d)  $\ln x = 7.5$   
 (e)  $2 \ln x = 5$             (f)  $\ln(2x - 1) = -3$                     (g)  $4e^{3x} + 1 = 37$             (h)  $e^x = 5$
15. The graph of  $y = \ln x$  lies in Quadrants
- (1) I and II                                    (2) II and III                                    (3) III and IV                                    (4) I and IV
16. Solve for  $x$ :  $\log_3(x+4) + \log_3(x-2) = 3$
17. Solve for  $x$ :  $\log_2(x^2 - 6x) - \log_2(1-x) = 3$
18. Mr. Shahom (who has just won the lottery) has decided to purchase a new car. He has narrowed down his choices to the following two cars:
1. *Chevrolet Corvette Z06* which costs \$71,275 and is expected to depreciate at 12% per year.
  2. *Porsche 911 Carrera* which costs \$73,500 and is expected to depreciate at 15% per year.
- Since he plans to sell his car in three years, he would like to purchase the car that is expected to be worth the most after three years. Which car should Mr. Shahom buy? Justify your answer by computing the value of each car after three years. Show all your calculations.
19. Akeem invests \$25,000 in an account that pays 4.75% annual interest compounded continuously. Using the formula  $A = Pe^{rt}$ , where  $A$  = the amount in the account after  $t$  years,  $P$  = principal invested, and  $r$  = the annual interest rate, how many years, to the nearest tenth, will it take for Akeem's investment to triple?