

**Exam I: Night Before Drill**

*Note:* This collection of questions is intended to give you an idea of different types of questions that might be asked on the exam. This is not intended to represent an actual exam. These questions cover Chapters 1, 2, and Appendix B in *Calculus for Business, Economics, Life Sciences, and Social Sciences* by Barnett, Ziegler, and Byleen. There is an emphasis on material from sections 2.2-2.3, which I have not previously reviewed. However, material from all sections is represented.

1. Determine which of the following are exponential growth and which are exponential decay functions. How much “material” do you start out with in each case?

(a)  $f(x) = 2(0.5)^x$

(b)  $g(x) = 3e^{5.5x}$

(c)  $h(x) = 0.5(3.5)^x$

(d)  $k(x) = e^{-4x}$

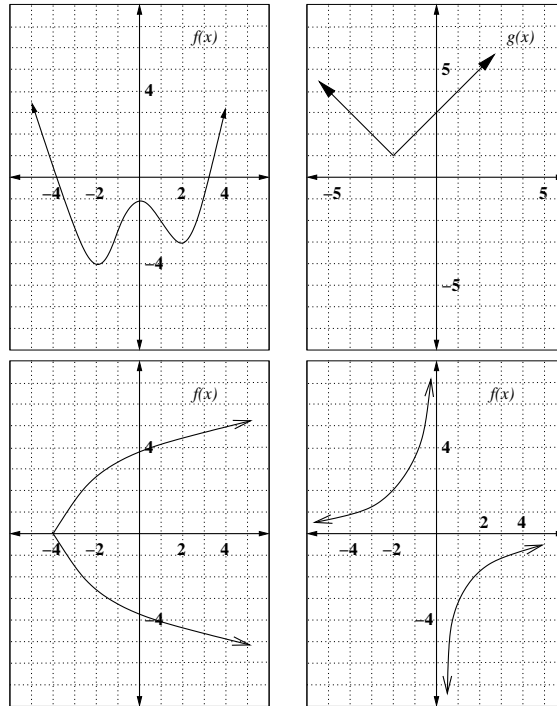
2. If I invest \$5000 into an account paying 6.8% interest compounded quarterly, how much will I have in the account in 4 years?

3. How long will it take for \$8500 to accumulate to \$10,000 in an account paying 7.2% interest compounded semi-annually?

4. Find the interest rate for an account compounded monthly in which \$3000 grows to \$4000 over 5 years.

5. How many days will it take for \$500 to grow to \$575 in an account paying 6.5% simple interest?

6. Are the following one-to-one functions?



7. Find the inverse of  $f(x) = \frac{2}{1+x}$ .

8. Rewrite the following in logarithmic form:

(a)  $2^5 = 32$

(b)  $e^0 = 1$

9. Write the following as a single logarithm:  $\frac{1}{3}(\log_b x - \log_b y + 2 \log_b z)$

10. If  $\log_b 3 = 1.578$  and  $\log_b 7 = 2.638$ , evaluate  $\log_b \left( \frac{49b}{3} \right)$

11. Solve the following for  $x$ :

(a)  $3^x = 27^{2x+1}$

(b)  $2 \cdot 7^{2x} = 215$

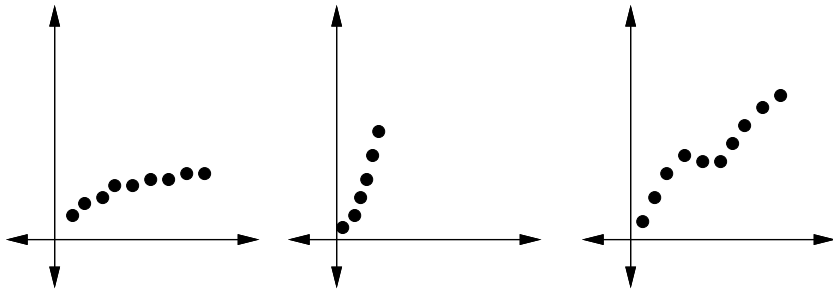
(c)  $3e^{4x} - 1 = 7$

(d)  $\log_2(x + 6) + \log_2 x = 4$

(e)  $\ln(\ln x) = 3$

12. How long will it take for your money to triple in an account paying 8% interest compounded continuously?

13. Which regression model would best fit the following data?



14. The following table gives the population (in hundreds of people) of Podunkville, USA for some selected years.

Year(x)	1800	1830	1850	1875	1900	1925	1950
Population(y)	25	60	125	350	680	1400	2500

- (a) Let  $x = 0$  represent the year 1800. Which model (LINEAR, QUADRATIC, or EXPONENTIAL) best explains this data? Once you have decided, write your model rounded to four decimal places and explain why you chose this model.
- (b) Use your unrounded model to predict the population in 1999.
- (c) Use your unrounded model to estimate when Podunkville had 9600 people.

15. Find the domain of the following functions:

(a)  $f(x) = (2x + 7)^{-5/8}$

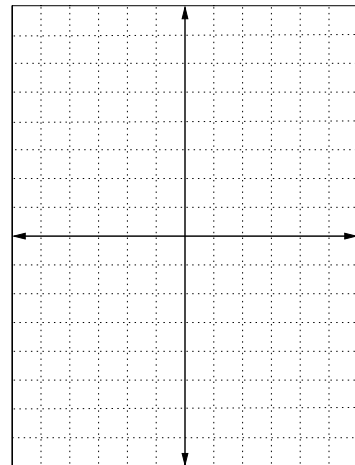
(b)  $g(x) = \sqrt[7]{4x - 8}$

(c)  $h(x) = \log_8(5x - 9)$

(d)  $m(x) = \sqrt{3}x^{10} + 6x^8 - 5.5x^4 - ex + 100$

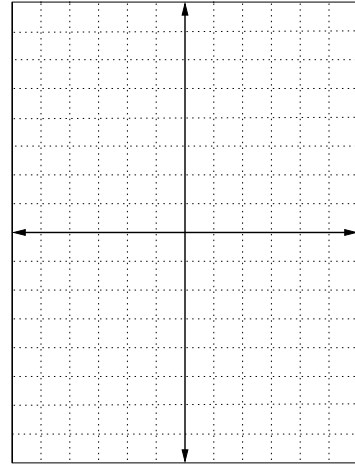
16. Using the function in #15(d), what is the maximum number of turning points and the maximum number of  $x$ -intercepts the graph will have. Also, what directions will the ends of the graph be going?

17. Make an accurate graph of  $f(x) = \begin{cases} \sqrt{x} & , x \leq 1 \\ 2x - 3 & , 1 < x < 3 \\ -3 & , x > 3 \end{cases}$



18. Find the domain, all asymptotes, intercepts and any “holes” which occur in the graph of the following function and then make a sketch of the function.

$$f(x) = \frac{4(x-3)(x-1)}{(2x-2)(x+4)}$$



19. Write the equation of the function that would be found by taking the graph of  $g(x)$  and then performing the following operations: move left 3 units, reflect over the  $x$ -axis, and move down 6 units.

20. Given the quadratic function,  $f(x) = 3x^2 + 6x - 18$ , find

- (a) the vertex.
- (b) the  $x$ -intercept(s).
- (c) the  $y$ -intercept(s).

21. KB and Co. produces TVs. It costs KB and Co. a total of \$800 to produce 5 TVs. It can sell a total of 5 TVs when they are priced at \$250 each and 10 TVs if the price is reduced to \$150 per TV. If KB and Co. decides not to produce any TVs, they will still have costs totaling \$400. Find

(a) the linear price-demand function.

(b) the cost function.

(c) the revenue function.

(d) the profit function.

(e) the equilibrium point(s) if the price-supply function for the TVs is given to be  $p = 5x + 50$ .

(f) the break-even point(s) and, therefore, over which intervals KB and Co. will realize a profit gain or loss.

(g) the price at which KB and Co. should sell TVs in order to maximize their revenue.

(h) the price at which KB and Co. should sell TVs in order to maximize their profits.