

Show all your work to get proper credits. Otherwise, no credit will be given. This is only the review for exam and **you should review other necessary work**. Exam 4 covers sections 4.1,4.3,4.4,6.1-6.5.

1. Find the amount s of advertising that maximizes the profit $P = -0.1s^2 + 6s + 100$, where s and P are measured in thousands of dollars and what is the maximum profit, then?

2. Fill in the table so it is exponential data and find its formula.

x	0	2	4	
y	2.60		210.6	631.8

3. Sketch the following functions. Label them clearly.

(a) $y = (x+1)^2$ (b) $y = -(x+2)^2 + 1$ (c) $y = -2x^2 + 4x + 1$

(d) $y = \log_3 x$ (e) $y = \ln x + 1$

4. (a) Divide $8x^3 + 4x^2 - x - 5$ by $x+3$ in two methods, polynomial division, synthetic division and write your answer in two ways.

(b) Use the remainder theorem to verify your remainder obtained in (a) is correct. Is $(x+3)$ a factor of the polynomial $8x^3 + 4x^2 - x - 5$?

5. The parents of a newborn baby infant place \$10,000 in an investment that pays 8% annual interest compounded quarterly. What sum is available at the end of 18 years to finance the child's college education?

6. Solve the equation for x .

(a) $\log_{16} x = 1/2$

(b) $3^{2x} = 81^{4/3}$

(c) $\log_3(x-1) = 2$

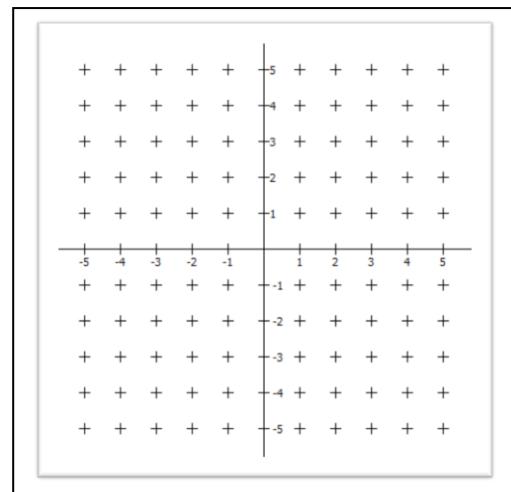
(d) $\log x + \log(x-3) = 1$ (e) $\log_2(x+4) = 3 - \log_2(x-2)$

7. The Davis National bank pays 6% interest compounded quarterly. How long will it take for a deposit to triple in value?

8. Suppose that the number N of mopeds sold when x thousands of dollars are spent on advertising is given by $N = 4000 + 1000\ln(x+2)$. How much advertising money must be spent to sell 6000 mopeds?

9. If $\log 2 = s$, $\log 3 = t$ and $\log 5 = u$, then express the following in terms of s, t , and u .

(a) $\log 18$ (b) $\log \frac{5}{4}$ (c) $\log 1.5$ (d) $\log \sqrt{7.5}$



10. Fechner's Logarithmic Law in psychology is used to measure notable changes in sensory response based upon equal increases of a particular sensory stimulus. The law is given by the equation $S = k \log l$ where S is the magnitude of the sensory experience, l is the physical intensity, and k is a scaling constant. Determine the physical intensity of a sensory experiment if the recorded magnitude of sensation is 0.5005 and the constant $k = 10$.

11. A rectangular region with one side against an existing building is to be fenced in. If 100 feet of fencing material are available, what dimension will maximize the area of the region? What is the maximum area?

Answers:

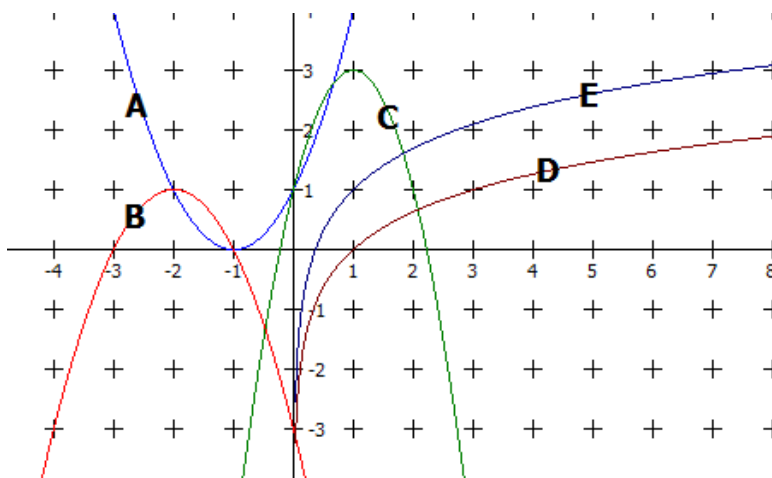
1. when $x=30$ (thousands), profit becomes maximum \$190(thousand)

2.

x	0	2	4	5
y	2.60	23.4	210.6	631.8

 $y = 2.6 \cdot 3^x$

3.



4. (a) $8x^3 + 4x^2 - x - 5 = (8x^2 - 20x + 59)(x + 3) - 182$ or $\frac{8x^3 + 4x^2 - x - 5}{x + 3} = 8x^2 - 20x + 59 + \frac{-182}{x + 3}$

(b) if $P(x) = 8x^3 + 4x^2 - x - 5$, then $P(-3) = -182$ and $x+3$ is not a factor of $P(x)$ because the remainder is not equal to zero.

5. \$41,611.40 6. (a) 4 (b) $8/3$ (c) 10 (d) 5 (e) $-1 + \sqrt{17}$

7. 18.5 years 8. \$5389 9. (a) $s+2t$ (b) $u-2s$ (c) $t-s$ (d) $0.5t+0.5u-0.5s$

10. 1.122147

11. 25 by 50 and maximum area is 1250 square feet