Math 5700 Homework # 8 Logarithms/Exponential Functions and Miscellaneous (Fun) Questions

Rewrite these expressions using log properties.

(1)
$$\log\left(\frac{p^2q^3}{r}\right)$$
 2 $\log p + 3 \log q - \log r$
(2) $5 \ln|x-2| - \ln|x+2| - 3 \ln|x|$ $\ln\left(\frac{|x-2|^5}{|x+2| \log^3 r}\right)$

(2)
$$5 \ln|x-2| - \ln|x+2| - 3 \ln|x|$$
 $\ln \left(\frac{|x-2|^{5}}{|x+2|^{1}}\right)$

(3)
$$4(\ln x + \ln(x+5)) - 2\ln(x-5)$$

we these equations

Solve these equations.

(4)
$$\log(5x) + \log(x-1) = 2$$

(5)
$$14e^{3x+2} - 50 = 510$$
 $\chi = l_{1}40 - 2$ ~ 0.563

(6)
$$e^{2x} - 6e^x = -8$$
 $x = 2$

lve these equations.
(4)
$$\log(5x) + \log(x-1) = 2$$
 $\times = 5$
(5) $14e^{3x+2} - 50 = 510$ $\times = 2 + 40 - 2$ $= 0.563$
(6) $e^{2x} - 6e^x = -8$ $= 2 + 2 + 3$
(7) $4\ln(3x) = 15$ $= 2 + 3 + 4$
(8) $1 + (x+2) + 4 + 3 + 4$

(8)
$$\log(x-1) = \log(x-2) - \log(x+2)$$
 \bowtie S .

(9)
$$\log(x+2) - \log x = \log(x+5)$$
 $\chi = -2 + \sqrt{6} \simeq 40.44$

Prove these statements are false.

(10)
$$\ln(x+y) = \ln x + \ln y$$
 Let $y = 1$ $\ln(x+t) = \ln x + \ln t = \ln x + \ln t$

(12)
$$\ln\left(\frac{x}{y}\right) = \frac{\ln x}{\ln y} \quad \text{if } x = y = 1, \quad \ln\left(\frac{x}{y}\right) = \ln 1 = 0$$

(13) You are depositing \$1000 in a savings account. Which of the following will produce the largest balance in ten years?

(14) The half-life of radioactive actinium is 22 years. What percent of a present amount of radioactive 450.5496P ~ 552 actinium will remain after 19 years?

(15) What is the greatest divisor of 19! and (19! + 17)?

(16) If you lose 20% on an investment during the first year and gain 25% the following year, what is your net gain over the two years?

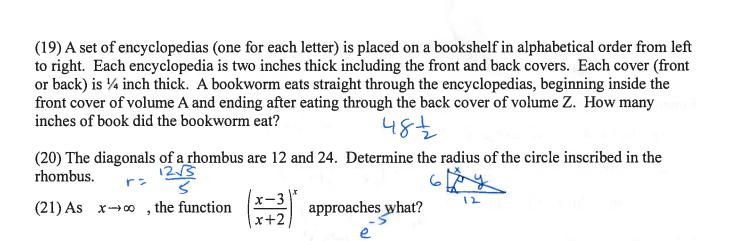
(17) How many divisors does the number 2007 have?

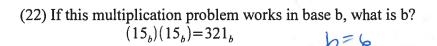
(18) What are the dimensions of the rectangle with the largest area that can be inscribed in the ellipse

$$\frac{x^{2}}{4} + \frac{y^{2}}{9} = 1 ? 2\sqrt{2} \times 3\sqrt{2}$$

$$A = \times (\frac{3}{2}\sqrt{4x^{2}}) \text{ max mite}$$

$$= 1 \times (\frac{3}{2}\sqrt{4x^{2}}) + \frac{3}{2}\sqrt{2}$$





(23) If
$$f(x)=3x^2-x+4$$
, $f(g(x))=3x^4+18x^3+50x^2+69x+48$, then what is one of the sums of all the coefficients of $g(x)$?

(a) 8 (b) 1 (c) 3 (d) 7 (e) 0

area of the circle?
$$\frac{3\sqrt{3}}{\sqrt{4\pi}}$$
 (25) Let $y_1 = f(x) = \frac{x+1}{x-1}$; $y_2 = f(y_1)$; $y_3 = f(y_2)$; ... $y_n = f(y_{n-1})$, for $n = 1, 2, 3, 4, ...$ Find y_{100} .

- (26) In a survey of 115 people, only 20 liked all 3 candies: licorice, chocolate and candy corn. Twenty-four did not like any of the candy, 15 liked only chocolate, 41 disliked chocolate but liked at least one of the other two kinds of candy. If 27 liked exactly 2 of the 3 candies, 11 liked only licorice malle Venn dragram and 59 like candy corn, how many liked chocolate and licorice, but not candy corn?
- (27) Suppose it takes h minutes to fill a bath tub using the hot water faucet and c minutes to fill the same tub using the cold water faucet. Starting with an empty tub, the hot water faucet is turned on and
- (28) Suppose a bag contains the six letters of the word "booboo." If you take one letter out of the bag at a time and line them up from left to right, what is the probability that you will spell the word "booboo?"

(30) What is the value of
$$2 + \frac{1}{2 + \frac{1}{2 + \dots}}$$
? = $-1 + \sqrt{2}$