Math 30, Extra Credit Homework 7 on sections 3.3, 3.4, 4.1

Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is usually not enough. Do all 15 questions - they are worth 2 points each. Hand in your solutions next week only.

For these first 10 questions, *check that your answers match the solutions on page 3*. If you don't get the same answers then look at your notes or the book or ask me. Only do the last five questions when you are sure you understand the first ten.

(1) Expand as much as possible and evaluate without a calculator: $\log_3\left(\frac{x^2y^5}{81}\right)$

(2) Combine into a single logarithm and evaluate: $\log 6 + \log 50 - \log 3$

(3) If $\log_b x = 18$ and $\log_b y = 2$ then find:

- **(a)** $\log_b(xy)$
- **(b)** $\log_b(x/y)$
- **(c)** $\log_b(x+y)$

(4) Use the change of base formula to express $\log_3 30$ using the common logarithm (base 10). Then use your calculator to evaluate it correct to 4 decimal places.

(5) Solve exactly:

- **(a)** $3^{2x-1} = 27^{x-1}$
- **(b)** $4e^{3x} = 60$

(6) Solve: $\log(x-2) + \log 5 = \log 100$

(7) Solve: $\ln(x-4) + \ln(x+1) = \ln(x-8)$

(8) Convert $150°$ into radians and graph this angle in standard position.

(9) Convert $-\pi/8$ into degrees and graph this angle in standard position.

(10) Suppose a central angle in a circle of radius 4 inches corresponds to an arc length of 10 inches along the circumference. Use the formula $s = r\theta$ to find the size of this angle first in radians and then in degrees.

Five more questions. Show clearly all your working out and reasoning.

(11) Expand as much as possible and evaluate without a calculator: $\log_5 \left(\dfrac{a^3 b^5}{5c} \right)$

(12) If $\log_b x = 12$ and $\log_b y = 4$ then find:

(a) $\log_b(xy)$

(b) $\log_b(x/y)$

(c) $\log_x b$

(13) Use the change of base formula to express $\log_2 1000$ using the common logarithm (base 10). Then use your calculator to evaluate it correct to 4 decimal places.

(14) Solve exactly:

(a) $7^{x+3} = 8^x$

(b) $\log_7 x + \log_7(x + 48) = 2$

(15) Suppose a central angle in a circle of radius 5 inches corresponds to an arc length of 3 inches along the circumference. Use the formula $s = r\theta$ to find the size of this angle first in radians and then in degrees.

Answers to questions (1)-(10):

(1) $2\log_3 x + 5\log_3 y - 4$

(2) 2

(3) *(a)* $\log_b(xy) = 20$

(b) $\log_b(x/y) = 16$

(c) $\log_b(x+y)$ cannot be found as a number

(4) $\log_3 30 = \dfrac{\log 30}{\log 3} \approx 3.0959$

(5) *(a)* $x = 2$

(b) $x = \dfrac{\ln 15}{3}$

(6) $x = 22$

(7) No solution.

(8) 150 degrees is $5\pi/6$ radians. Graph with initial side on the positive x axis and moving counter clockwise to the terminal side.

(9) $-\pi/8$ radians is -22.5 degrees. Graph with initial side on the positive x axis and moving clockwise to the terminal side.

(10) The angle is $5/2 = 2.5$ radians and equals $450/\pi \approx 143.2$ degrees.