MTH 128 & 129 PRACTICE COMMON FINAL

1. Let $f(x) = \sqrt{x-1}$ *and* $g(x) = \frac{1}{x}$.

   a. Write the following in interval notation. (6 points)

      1) domain of f 2) domain of g

   b. Find and simplify (14 points)

      1) $\frac{f}{g}(x)$ 2) $f(1+h)$ 3) $(f \circ g)(x)$

2. Write the following in exact form without using the absolute value symbol. (6 points)

   a. $|1-\sqrt{2}|$ b. $\left|\frac{1}{2}-\frac{1}{\sqrt{2}}\right|$ c. $|x-4|$ if $x > 4$

3. A rectangle has a perimeter of 36 feet. Exress the area A as a function of the length L of one of its sides. (8 points)

4. Show that the equation $x^2 + y^2 + 6x + 10y - 44 = 0$ represents a circle. (10 points)

   a. Give the coordinates of the center. B. Find the radius.

5. Solve the following and write your answers in interval notation. (16 points)

   a. $|4-3x| \geq 7$ b. $\left|\frac{x+1}{2}\right| \leq 6$

6. Consider the function f defined by $f(x) = \frac{-x^2}{3(x+1)(5-x)}$ (26 points)

   a. Describe the end behavior of the graph. (Give the equation of any horizontal asymptotes)

   b. Describe the domain f in interval form.

   c. Write the equation(s) of all vertical asypmtotes, if any.

   d. Find the coordinates of the x and y-intercepts of the graph, if any, or write 'none'.

   e. Give the interval chart (sign chart) for the graph of f.

   f. Find all values of x for which the graph is always above the x-axis.

   g. Solve the inequality $\frac{-x^2}{3(x+1)(5-x)} \geq 0$. Express the solution set in interval notation.

7. Set up an appropriate equation for the situation described below. Then solve the problem. (8 points)

   Mozart composed 11 less than $\frac{1}{2}$ of the number of symphonies that Haydn composed.

   Together they compose 145 symphonies. How many symphonies did Mozart compose?

8. Find all points on the x-axis that are 5 units from the point $(2,3)$. (6 points)

9. Evaluate the following without the use of a calculator. (16 points)

a. $3^{log_3 7}$ b. $log_{16}16$ c. $10^{log^{94}}$ d. $log_6 12 + log_6 18$

10. Given the equation of a parabola in standard form: $y = \frac{-3}{7}\left(x - \frac{14}{17}\right)^2 + \frac{5}{9}$ (12 points)

a. Give the equation for the axis of symmetry.

b. Specify whether the function attains a maximum or a minimum value.

c. What is this value?

d. For what value of x is this value obtained?

e. What are the coordinates of the vertex?

11. Write the expression $\ln y^2 + \frac{1}{3}\ln(x^3y^9) - 5\ln y$ as a single logarithm. (8 points)

12. Solve for x. No calculator of any kind is allowed. (16 points)

a. $2(1 + 3^x) = 7$ b. $\log_{15} x + \log_{15}(x - 2) = 1$

13. Write an appropriate equation for the simulation described below. Then solve the problem.

The admission fee at an amusement park is \$1.50 for children and \$3.50 for adults. On a certain day 2400 people entered the park and the admission fees collected totaled \$5,200.00. How many children and adults were admitted? (8 points)

14. Find all the solutions of the following systm of equations. Give all solutions as ordered pairs. (10 points)

$$\begin{cases} x^2 + y^2 = 8 \\ x + y = 0 \end{cases}$$

15. Following is an interval chart used to solve the inequality $(x + 2)(x - 3) < 0$.

interval	$(-\infty, -x)$	$(-2,3)$	$(3, \infty)$
test x-value	-3	0	4
resulting product	$(-1)(-6)$	$(2)(3)$	$(6)(1)$
sign of that product	pos	neg	pos
sign of product for every x in the interval	pos	neg	pos

Use the above information to find the solution sets of the following: (10 points)

a. $(x + 2)(x - 3) \leq 0$ b. $(x + 2)(x - 3) > 0$ c. $(x + 2)(x - 3) \geq 0$