## Your Name:

## Math 1010-1 - Summer 2009 - Final Exam <br> $\begin{array}{llllllllll}1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10\end{array}$ <br> $\begin{array}{lllllllllll}11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 & \text { Total }\end{array}$

## Instructions

1. This exam is closed books and notes. Do not use a calculator or any other electronic devices. Turn off your cell phone!
2. Use these sheets to record your work and your results. Use the space provided, and the back of these pages if necessary. Show all work. Unless it's obvious, indicate the problem each piece of work corresponds to, and for each problem indicate where to find the corresponding work.
3. Accuracy is more important than speed. Don't get stuck on one problem. If you can't answer a question immediately go on and return to that question only after you have answered the others.
4. Simplify any algebraic expressions and reduce any fractions.
5. If you are done before the allotted time is up I recommend strongly that you stay and use the remaining time to check your answers. There's a good chance you made some mistakes and you can find them!
6. All questions have equal weight.
7. As discussed in class, $\log x$ denotes the common (Base 10) logarithm of $x$ and $\ln x$ denotes the natural logarithm of $x$.
8. Please Box Your Answers
-1- (Fractions.) Simplify:

$$
\frac{\frac{1}{2}-\frac{2}{3}}{\frac{1}{3}+\frac{3}{5}}
$$

-2- (A Linear Equation.) Solve the equation

$$
6 x-3=12-3(x-1)
$$

-3- (A Quadratic Equation.) Find all solutions of the equation

$$
x^{2}-2 x-1=0
$$

-4- (Another quadratic equation.) Find all solutions of

$$
\frac{1}{x-2}+\frac{1}{x-3}+1=0
$$

-5- (Polynomials.) Write the following polynomial expression in standard form. What is its degree and its leading coefficient?

$$
\left(x^{2}-1\right)(x+2)+3 x+4
$$

-6- (Division of Polynomials.) Find the quotient and the remainder if $5 x^{3}+x^{2}-3 x+1$ is divided by $x^{2}-2 x+1$.

For the next two questions let

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

-7- (Domain.) What is the domain of $f$ ?
-8- (Evaluating at a number.) Find $f(5)$.
-9- (Linear System.) Solve the system

$$
\begin{aligned}
& 4 x-y=2 \\
& 2 x+y=4
\end{aligned}
$$

State how you solve it, don't just give the answer.
-10- (Another Linear System.) Solve the linear system

$$
\begin{aligned}
x+y+z & =2 \\
x+2 y-z & =6 \\
2 x+3 y-z & =9
\end{aligned}
$$

Again, state how you solve it, don't just give the answer.
-11- (Straight Lines.) Find an equation of the line that passes through $(1,1)$ and has slope -1.
-12- (Distance.) Find the distance between the point $(-1,2)$ and the origin.
-13- (Rational Expressions.) Simplify (i.e., write over a common denominator, write the numerator in standard form, and don't unfactor the denominator) the expression

$$
\frac{1}{x-1}+\frac{1}{x-2}+\frac{2}{x-3}
$$

-14- (Logarithms.) Compute the following logarithms:

$$
\begin{gathered}
\log _{2} 8= \\
\log 0.1= \\
\log _{5} 25=
\end{gathered}
$$

-15- (More on Logarithms.) Suppose for some (unknown) base $b$

$$
\log _{b} 3=0.6 \quad \text { and } \quad \log _{b} 5=0.8
$$

Then

$$
\begin{gathered}
\log _{b}(15)= \\
\log _{b}(0.6)= \\
\log _{b}(25)= \\
\log _{b}(27)=
\end{gathered}
$$

-16- (Money makes the world go round.) You invest money at an annual interest rate of 5 percent. How long will it take for your investment to double? Give your answer as a logarithmic expression, don't worry about a decimal value.
-17- (The joy of ownership.) You have a backyard that's three times as long as it is wide. Within 1 yard of its boundary you plant shrubs and flowers, and the remainder you cover with 340 square yards of lawn. How long and how wide is your yard?
-18- (Team Work.) It takes you 6 hours to dig a hole. It takes your brother 8 hours to dig the same hole. Your younger sister takes 12 hours. How long does it take the three of you working together?
-19- (Logarithms.) Write the expression

$$
\ln x-\ln (x+1)+2 \ln (x-1)
$$

as a single logarithm.
-20- (Graphs.) Draw the graphs of the natural exponential $f(x)=e^{x}$ and the natural logarithm $g(x)=\ln x$.

If you like take a note of your answers on this page, detach the page, and compare your answers with those on the answer sheet.

