Math 191
Extra Credit Projects

You will have the chance to earn up to 20 points of Quiz Extra Credit
by working on posted Extra Credit Assignments, like this one. These points
will be added to you total quiz score, which is worth 15 percent of you final
course grade. Grading for Extra Credit will be somewhat strict, so please do
not bother to turn in work that you do not feel confident about (instead, ask
me about it first). It's okay to turn in individual parts of a project, as long
as they are well-written and clearly thought out.

1. [Up to 5 points of Quiz EC] This project is designed to help me revise the
handout on Common Arithmetic Mistakes, so that it will be more helpful to
students.
    Look back at the handout Common Arithmetic Mistakes. Are any parts
of this handout confusing or not helpful? If so, explain as best you can what
you find confusing. Can you think of an example in which you're unsure of
how to apply the methods discussed?
    Are there mistakes you've made on quizzes or exams that are not listed
on this sheet? If so, explain your mistake as well as you can.

2. [Up to 5 points of Quiz EC] (Logarithmic Differentiation) Using logarith-
mic differentiation, derive the following rules for derivatives:

    a) The power rule: if $y = x^a$, then $y' = ax^{a-1}$. (We proved this in class
when a is an integer, but with logarithmic differentiation you can prove it
for any real number a.)

    b) The product rule: if $y = f(x)g(x)$, then $y' = f'(x)g(x) + f(x)g'(x)$.

    c) The quotient rule: if $y = f(x)/g(x)$, then $y' = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$.

    d) When using logarithmic differentiation, you need to take the loga-
rithm of both sides of an equation. This makes no sense unless the function
you're looking at is positive. Can you still justify your answers to the above
questions? Does taking the absolute value help?