What You Should Know and Common Errors

The purpose of the exams in the class you are taking is to test your knowledge of the class material; *not* your knowledge of previous material; however, *you are expected to know previous material.* If lack of such knowledge leads you to the wrong solution, you will lose points.

Below is a list of some common types of errors, sorted by the level at which you should have learned to correct procedure. I have illustrated most errors with actual examples from past exams. If you make such errors, do not expect to gain points by saying something like "I understood the problem, I just made an algebra error."

This page of errors was started 12/3/99 and will grow with time as real-life examples accumulate.

MOST BASIC

- **Copying the problem incorrectly**: If you copy the problem incorrectly, you may receive partial credit or you may receive no credit. For example, a copying error that leads to a much simpler problem will probably lead to no credit.
- **Misunderstanding the problem**: If you are not sure what is being stated or asked for in a problem, it is up to you to ask. If you misinterpret a problem because you do not understand the terminology or the usage of the English language, expect to receive no credit. If you misinterpret a problem because it is ambiguously phrased, you will not be the only one in class to do so. In that case, credit will be given for both interpretations.

PRECALCULUS

- **Adding fractions**: You can't add numerators and denominators. An example of such an error is

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

- **Manipulating powers**: Solve $\sqrt{y} = x^{3/2}/3 + C$ for y.

$$y = \left(\frac{x^{3/2}}{3} + C\right)^2 \qquad \text{correct}$$

$$= \left(\frac{x^{3/2}}{3}\right)^2 + C^2 \qquad \text{wrong!}$$

$$\text{Next} \quad \left(\frac{x^{3/2}}{3}\right)^2 = \frac{x^3}{3} \quad \text{or} \quad \frac{c^{(3/2)^2}}{9} \qquad \text{both wrong!}$$

  Another power error: $\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$.

- **Solving polynomial equations**: You are expected to be able to solve $p(x) = 0$ when $p(x)$ is easily factored into a product of linear and quadratic factors. For example, the solutions to $x^2(1-x^2) = 0$ are $x = 0,\ 1,\ -1$.
- **Manipulating exponentials and/or logarithms**: Common mistakes are:
  - $e^{b+c} = e^b + e^c$ (should be a product),
  - $\ln(b+c) = \ln b + \ln c$ (no simple form), and
  - $e^b e^c = e^{bc}$ (powers add). Here are some examples from exams:

$$e^x\, e^x \quad \text{does not equal} \quad e^{x^2}$$

$$e^{\ln x + \ln C} \quad \text{does not equal} \quad x + C$$

$$e^y = e^{-x} + C \quad \text{does not give} \quad \ln(e^y) = \ln(e^{-x}) + \ln C.$$

INTEGRAL CALCULUS

- **Omitting the constant in indefinite integrals**:
- **Logarithm integrals**: (a) People forget the absolute value in $\int dx/x = \ln|x| + C$.
  (b) A denominator doesn't always mean a logarithm. One error is $\int dx/e^x = \ln e^x + C$. The correct answer is $-e^{-x} + C$. To get a logarithm, $\int f'(x)dx/f(x) = \ln|f(x)| + C$ — you need the $f'(x)$ in the numerator.
  (c) Sometimes people make the reverse error of *not* recognizing that an integral gives a logarithm, for example $\int t\,dt/(t^2 + 1)$, and try all sorts of complicated and/or incorrect things to evaluate it. In particular, it is *not* $t \arctan t$.