

# Common Mistakes to Avoid

## 1 Bad Algebra

The following is a partial list of “fatal” algebra mistakes. Whenever these mistakes appear in your work, you can expect to automatically lose at least 50% of the points assigned to the problem. So take care to avoid these pitfalls!

- Notice that  $(a + b)^n \neq a^n + b^n$ , ( $n \neq 1$ ). In particular, this means that  $(a + b)^2$  doesn't expand to  $a^2 + b^2$  and  $\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$ .
- You can not break up a rational expression of the form  $\frac{a}{b + c}$  into the sum  $\frac{a}{b} + \frac{a}{c}$ . So don't do it!
- Do not replace  $\sin(ax)$  with  $a \sin x$ ,  $a \neq \pm 1$ . They are not equal! (The amplitudes are different.) This goes for the other trig functions too.
- The following are very serious violations of the cancellation laws:

$$\frac{a + b}{a + c} \neq \frac{b}{c} \text{ and } \frac{a + c}{ab} \neq \frac{c}{b}$$

- It is true that if  $a \cdot b = 0$ , then either  $a = 0$  or  $b = 0$ . However, IT IS NOT TRUE that if  $a \cdot b = c$  ( $c \neq 0$ )  $\Rightarrow a = c$  or  $b = c$ .
- Be careful when factoring a constant out of a power:

$$(cx + cy)^n = c^n(x + y)^n.$$

You are not allowed to replace  $(cx + cy)^n$  with  $c(x + y)^n$  whenever  $c \neq 1$ .

## 2 Limits

- When using analytic means to compute a limit, be sure to continue to use the limit notation until you substitute a value in for the variable.
- Do not write the limit notation after you substitute.
- Be sure to use appropriate equal signs in your solution.

## 3 Derivatives

- Do not equate the function to its derivative, i.e., do not write “ $f(x) = f'(x)$ .” In general, they are not the same!
- Memorize your basic differentiation formulas, in particular the quotient rule.
- Write a summary sentence when using the derivative to answer a question such as slope of the tangent, equation of the tangent line, maximum or minimum of a function, etc.

## 4 Integrals

- Always include a “ $+C$ ” in your final answer to any evaluation of an indefinite integral.
- Be sure to keep the integral notation until you find an antiderivative.
- Be sure the integral notation is no longer present once you have performed the integration.
- Write down any substitution you are using, no matter how “simple” it seems.
- Change the limits of integration when you apply the substitution method to evaluate a definite integral.
- Be sure to use a summary sentence when you use integration to answer a question such as the area of a region or the solution to a differential equation.

## 5 Miscellaneous

- Study and be able to “recite” any NAMED THEOREM you have encountered.
- Label all graphs clearly. This includes marking intercepts and labeling functions.
- Use equal signs appropriately!!