

Below are discussed some common algebra errors, all of which have been made many times on homework this semester and were made at least several times on the first exam. (All of the discussion refers to “general” use of the false equality involving variables  $a$ ,  $b$ , and  $x$ . There may be special cases when the equality is true. E.g.,  $(a - b)^x = a^x - b^x$  is true, for any positive number  $x$ , if  $a = b$ . But “generally” the inequality is not true, even though it is often used by students.)

1. In expressions such as  $\frac{a - bc}{ax}$  and  $\frac{ad - bc}{ax}$  and  $\frac{ax}{a - bc}$  and  $\frac{ax}{ad - bc}$ , you can not cancel the “ $a$ ”.

2. A formula such as  $(a - b)^x = a^x - b^x$  is generally true ONLY when  $x = 1$ .

In particular, as has been pointed out in class **many, many times**,

$$(a - b)^{1/2} \neq a^{1/2} - b^{1/2} \quad \text{and} \quad (a - b)^2 \neq a^2 - b^2 \quad \text{and} \quad (a - b)^{-1} \neq a^{-1} - b^{-1}$$

3.  $\frac{a - ba^{-1}}{x} \neq \frac{a - b}{xa}$ ; similarly,  $\frac{a^{1/2} - ba^{-1/2}}{x} \neq \frac{a^{1/2} - b}{xa^{1/2}}$ . (**Why not?**)

4. You need to know what fractional exponents mean in expressions such as  $x^{1/2}$  and  $x^{-1/2}$ .

5.  $a - (x + y + z) \neq a - x + y + z$ . (**Why not?**)

6.  $ax^{-1} \neq \frac{1}{ax}$ . (There are special cases when “ $=$ ” is true; but “ $=$ ” does not hold generally.)

7. A formula such as  $c(a - b)^x = (ca - cb)^x$  is generally true ONLY when  $x = 1$ .