Problem 4: Combinations of Normal Distributions

Assigned: 13 October
Due: 28 October
Maximum Mark: 10 Points
Maximum Submission Length: 3 pages

Suppose that a distribution is normal, with mean μ=10 and standard deviation σ=5. Two samples a and b, each of length N, are independently drawn from this distribution. For which of the following operations on a and b will the resulting distribution also be normal?

If the distribution is normal, state this and provide **exact** mathematical expressions (integer, fraction, radical, etc.) for the mean, median, and standard deviation of the new distribution (do **not** use a decimal). If the distribution is not normal, use R to numerically estimate the values and express the result as a decimal (at least 3 significant figures).

Summarize your results in a table similar to the one given below. (Note that some quantities may not be well-defined mathematically. You do not have to check for this, but you can mark possible cases with asterisks.)

	normal?	Mean	Median	Standard Deviation
a	yes	10	10	5
b	yes	10	10	5
$a+3$				
$a+a$				
$a+b$				
$a-b$				
$a\times b$				
$a/3$				
$|a-10|$				
$a+2b$				
a^2+b^2				
a^2-b^2				