

## WRITING SAMPLE

### MATH 111

Consider the following problem and its two solutions.

**Problem.** Determine the values of  $x$  for which the expression  $\frac{x-2}{x+1}$  is negative.

*Solution 1.*

$$\begin{aligned}x = 2 &\implies 0 & x = -1 &\implies \text{undefined} \\x < -1 &\implies \frac{\text{neg}}{\text{neg}} = \text{pos} &&\implies \text{no} \\-1 < x < 2 &\implies \frac{\text{neg}}{\text{pos}} = \text{neg} &&\implies \text{yes} \\x > 2 &\implies \frac{\text{pos}}{\text{pos}} = \text{pos} &&\implies \text{no}\end{aligned}$$

*Solution 2.* First note that the expression is zero when  $x = 2$ , and that it is undefined when  $x = -1$ . We need to consider three cases: when  $x < -1$ , when  $-1 < x < 2$ , and when  $x > 2$ .

When  $x < -1$ , the numerator and denominator are both negative, and so the quotient is positive. When  $-1 < x < 2$ , the numerator is negative and the denominator is positive, and so the quotient is negative. When  $x > 2$ , the numerator and denominator are both positive, and so the quotient is positive.

Thus the expression is negative precisely when  $x$  is strictly between  $-1$  and  $2$ .

### COMMENTS

Both solutions have the ‘same’ mathematics, but the second is much more readable. (Could you even read the first without knowing what was going on?) The point of writing something down is to convey information. The second solution is clearly better.

A good write-up is an explanation to the reader. An explanation is more than a report of your findings or a summary of what you did. It is a guide for the reader to understand your reasoning.

A write-up can briefly remind the reader of the general theory but doesn’t need a lengthy discussion of the general procedure. Instead the solution should illustrate the procedure.

A write-up should not include trivial algebra and arithmetic, but should include algebra that is used to draw conclusions.

A write-up need not be long, but it needs to include enough of the computations and reasoning so that the reader can easily follow them and understand why the author believes the solution is correct.

Everything should be included in a sentence (the only exceptions are pictures and graphs), and the beginning and ending of each sentence should be clear.