

This graph shows which of the following is the greatest: $x+y$, $x \cdot y$, or $\max(x,y)/\min(x,y)$. The areas where multiplication produces the greatest result are green, the areas where division is greatest are yellow, and the areas where addition is greatest are red.

Some questions to think about:

- What are the equations of the curves separating the regions?
- As x and y get bigger, will the red region get so thin that it no longer exists? If not, does it approach a particular value?
- How would the graph look if we were only comparing multiplication and division?
- How would the graph look if we also allowed negative values for x and y and included a blue region for when $\max(x,y) - \min(x,y)$ is greater than the previous choices?

The graph was made using Excel, with the following equation:

```
=IF(MAX($A2*$B$1,$A2/$B$1,$A2+$B$1,$B$1/$A2)=$A2*$B$1,"M",IF(MAX($A2*$B$1,$A2/$B$1,$A2+$B$1,$B$1/$A2)=$A2/$B$1,"D",IF(MAX($A2*$B$1,$A2/$B$1,$A2+$B$1,$B$1/$A2)=$A2+$B$1,"A",IF(MAX($A2*$B$1,$A2/$B$1,$A2+$B$1,$B$1/$A2)=$B$1/$A2,"D"))))
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