

Exam #1, Part 2 - Prompts and Hints

Math 308 – Daugherty

October 18, 2018

1. Let a and b be positive real numbers with $a \geq b$. Prove that

$$\frac{a+b}{2} \geq \sqrt{ab}.$$

HINT(S):

- For your work, you can start with $\frac{a+b}{2} \geq \sqrt{ab}$, and try to get to something true. But for your proof, you have to go the other direction—conclude that $\frac{a+b}{2} \geq \sqrt{ab}$. You *cannot* start a valid proof of this claim with “suppose $\frac{a+b}{2} \geq \sqrt{ab}$.”

2. Let X and Y be subsets of a universal set U . Prove that

$$X - Y = X \cap Y^c.$$

HINT(S):

- Got back to the Lecture 9 notes for how to prove two sets are equal.

3. Let x and y be integers. Prove that if $x^2 + y^2$ is even, then $x + y$ is even.

HINT(S):

- Consider the contrapositive.
- Alternatively, consider $x^2 + y^2 + 2xy$.