Getting to know you Quiz (does not count towards the grade)

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Subject: pre0

with an attachment: pre0FirstLast.pdf

1.: What are your career goals?

I want to use my knowledge in Computer Science and Math to become an expert Software Engineer. Also hopefully one day work at Google or Apple!

2.: What are your hobbies?

I really like to build computers for fun! Unfortunately because of the pandemic computer parts are super expensive so I haven't been able to indulge in my hobbies recently.

3. What is a rational number?

A rational number is a number that can be represented as a ratio of two integers.

4. Prove that the sum of two rational numbers is also a rational number,

Let r and s be a rational number. It follows that r = p/q and s = t/v for some integers p, q, t, v. Then r+s = p/q + t/v = (pv + tq)/qv. Since the multiplication and sum of two integers is an integer, we can conclude that (pv+tq) is an integer and qv is also an integer, thus r+s is a rational number.

5. Prove or disprove (by giving a counterexample) : "the sum of two irrational numbers is always also an irrational number"

We can disprove this statement by observing that $\pi - \pi = 0$.

6. Prove that there are infintely many primes.

Didn't have time for this question!

7. Prove that $\sqrt{5}$ is an irrational number.

Assume sqrt(5) is rational. Then we can represent it as sqrt(5) = p/q for some integers p, q. Further assume p and q have no common factors. Then it follows that 5 = p^2 / q^2. Hence 5q^2 = p^2. We can see that 5 divides p^2, therefore divides p since 5 is prime. It follows that 5s=p for some integer s. Furthermore 5s^2=p^2 = 5q^2. Similar to before we can conclude that 5 divides q. Since p and q can be further divided by 5, we have reached a contradiction, hence sqrt(5) is irrational.