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

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Email to DrZlinear@gmail.com when I tell you to

Subject: pre0

with an attachment: pre0FirstLast.pdf

1.: What are your career goals?
I hope to become a software engineer or some kind of software developer. (I'm just taking this course because it sounded fun)

2.: What are your hobbies?

I enjoy reading and playing the piano.

3. What is a rational number?

A rational number is a number that can be written in the form p/q where p and q are rational and q isn't zero.

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

Assume some a and b are rational numbers.
Then by definition of rational there must exist some integers p and r and nonzero integers q and s such that
$a = p/q$ and $b = r/s$.
So, $a + b = p/q + r/s$
$= (ps + rq)/qs$
Define $j = ps + rq$. Because linear combinations of integers are integers, j is an integer.
Define $k = qs$. Because linear combinations of integers are integers and neither q nor s are zero, k is an integer.
So, $a + b = j/k$.
By definition of rational,
a + b, where a and b are rational, is also rational.

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

Counterexample: pi is irrational, as is 1 – pi.

pi + 1 – pi = 1, which is rational.

6. Prove that there are in infinitely many primes.

Assume that integer k is prime.
…
(something involving using k to derive another prime that’s larger than it?)

7. Prove that sqrt5 is an irrational number.

For the sake of contradiction, assume that sqrt(5) is rational.
Then by definition of rational there must exist some integers p and q where q is nonzero such that
sqrt(5) = p / q.
So,
5 = p^2 / q^2