

MATH 121
Real Numbers – Chapter R

1. Compile a list of 12 real numbers, in order, such that all of the following conditions are met:
 - a) Each number is contained in the interval $(1.9, 2)$.
 - b) Six numbers are rational, and six numbers are irrational.
 - c) One number is written as a fraction, one as a mixed number, one as a terminating decimal, one as a repeating decimal.
 - d) One number is between $1\frac{19}{21}$ and $1\frac{20}{21}$.
2.
 - (a) If one exists, find a real number between .701 and .70101.
 - (b) Find a real number between .701 and the number you produced in part (a).
 - (c) How many real numbers are there between .701 and .70101?
 - (d) Between any two distinct real numbers, how many numbers are there?
 - (e) Can you find a real number between $\overline{.9}$ and 1?
 - (f) What can you conclude from part (e)?
3.
 - a) Give an example of an irrational number a between the integers 1 and 2.
 - b) Now, give an example of another irrational number b between a and 2.
 - c) Now, give an example of another irrational number c between a and b .Based on your results from parts (a) through (c) above, complete the following:
 - d) Between any two rational numbers I can always find _____
4. FACT: $\sqrt{17}$ is an irrational number.
 - a) Using only multiplication (use a calculator but not the “square root” function), estimate $\sqrt{17}$ to the nearest thousandth.
 - b) Given that the segment below is 1 unit long, how could you construct a segment that is $\sqrt{17}$ units long? Hint: Consider right triangles.

5. True or False? If false, provide a counterexample.
 - a) Every real number can be expressed as a decimal.
 - b) Every real number can be expressed as a terminating decimal or a repeating decimal.
 - c) Every real number that can be expressed as a terminating decimal or a repeating decimal is really a fraction of integers in disguise.
6.
 - a) Give an example of a rational number (in fractional form) between $1/3$ and $1/2$.
 - b) Give an example of another rational number (in fractional form) between $2/3$ and $3/4$.
 - c) Give an example of another rational number (in fractional form) between $5/6$ and $6/7$.
 - d) Based on your results from parts (a) through (c) above, complete the following: Between any two rational numbers I can always find _____
7. Write a number between 13.252 and 13.2521