

Math 1050-006 Midterm 1 Practice Test

- 1.) Is $\{3, \frac{5}{7}, \frac{-3}{-65}, -271\} \subseteq \mathbb{Q}$? Why or why not?

- 2.) What is $\{1,7,8\} - \{1,8,9\}$?

- 3.) Is $[0, \infty) \subseteq \mathbb{R} - \{\pi\}$ a true statement? Why or why not?

- 4.) Is $[-17, \infty) \subseteq (-17, \infty)$ a true statement? Why or why not?

- 5.) Find 3 things that are wrong with the following statement:
 $[2, -1] \in [-\infty, \infty)$

- 6.) Suppose $f: \mathbb{N} \rightarrow \mathbb{R}$ is defined by $f(n) = \frac{1}{n^2}$
 - (a) n is an object of which set? (Rational numbers, Integers, Real numbers, or Natural numbers)?

 - (b) What is $f(2)$?

 - (c) What is $f(-3)$?

7.) Suppose $h: \mathbb{R} \rightarrow \mathbb{R}$ is an identity function ($h(x)=id(x)$)

(a) What is $h(\pi)$?

(b) What is $h(0)$?

8.) (a) What is the formula for an arithmetic sequence?

$$a_{n+1} =$$

(b) If $a_1, a_2, a_3, \dots = 3, -1, -5, \dots$

what do a_1 and d equal for this sequence? (i.e. fill in the unknowns in the arithmetic sequence formula from (

(c) What is the prediction equation for an arithmetic sequence?

(d) Use your solution in part (c) to predict the 500th term of the sequence given in part (b)

9.) What is the 9th term in the sequence

$$25, 15, 9, \frac{27}{5}, \dots$$

10.) (a) What is the equation for the sum of a geometric series, and what condition do we have on (r) in order to use this equation? (recall: $a_{n+1} = r \cdot a_n$)

(b) Using your solution in part (a) what is the sum of all of the terms in the sequence

$$2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}, \dots$$

11.) What is the sum of the first 30 terms of the sequence: 5, 3, 1, -1, ...

12.) What is $\sum_{k=1}^{50} 2k$

- 13.) A combination lock has forty numbers to pick from (1 - 40) and a combination is a list of 3 of these numbers where no two adjacent numbers are the same.
(i.e (38, 7, 4) is a combination, but (38, 38, 4) is not)

How many different combinations can a combination lock have?

- 14.) To play the North Carolina pick 5 lottery you need to create a ticket by picking any 5 of the 60 number choices (1 - 60) where the order of the choices does not matter.
How many different lottery tickets are there?

- 15.) (a) Write out the first 6 rows of Pascal's triangle (row 0 up to row 5)

15.) (b) Now use the Binomial Theorem and Pascal's triangle to solve $(x+y)^5$

(c) Using your result from part (b) solve $(z-3)^5$

16.) What is the implied domain of $h(x) = \frac{4x-5}{x-2}$

17.) If $f(x) = x^2 - 3$, $g(x) = x+5$ solve:

(a) $f \circ g(x)$

(b) $g \circ f(x)$