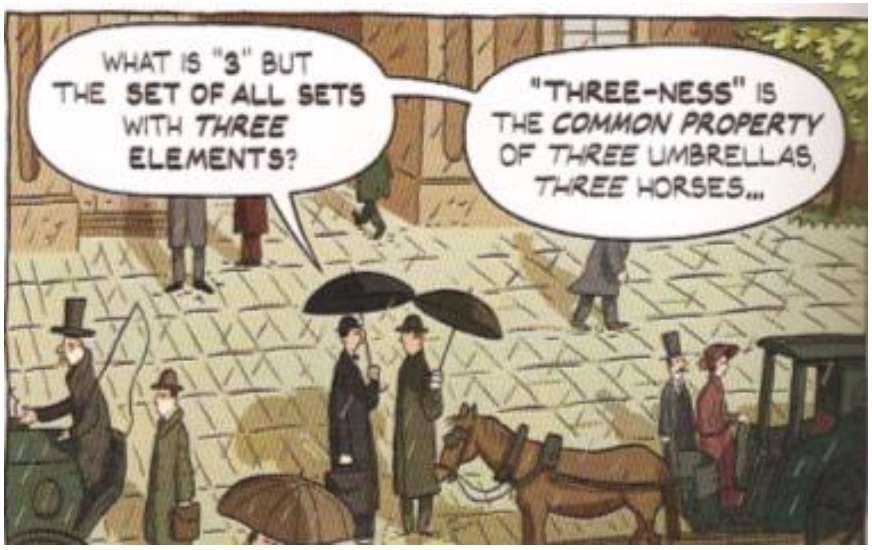
# MATH 201: CLASS DISCUSSION (14 JANUARY 2019)

## NAÏVE SET THEORY




(A) Explain the ambiguity in each of the following:

(1) I will have dinner with Albert and Betty or Carlos.
(2) If I study hard, then I will earn an A in Math or an A in English.
(3) Our beloved Queen cannot bear children.
(4) The police officer shot the burglar with the gun.
(5) I saw the bank this morning.
(6) Call me a taxi.
(7) Flying planes can be dangerous.
(8) Visiting relatives can be boring.

(B) Explain why each of the following statements is ambiguous.
(The following were compiled by Prof. Jeff Grey, University of Alabama)

(1) Advertising slogan: Nothing works better than our product.
(2) Students hate annoying professors.
(3) Norwegian cocktail lounge: Ladies are requested not to have children at the bar.
(4) At a Santa Fe gas station: We will sell gasoline to anyone in a glass container.
(5) In a Portland, Maine, parking garage: Tenants not paid by the 15th of the month will be terminated.
(6) In a Moscow hotel: You are welcome to visit the cemetery where famous Russian and Soviet composers, artists and writers are buried daily except Thursday.
(7) At a Swiss bistro: Our wines leave you nothing to hope for.
(8) Office of a dentist in Hong Kong: Teeth extracted by the latest methodists.
(9) In a New York medical building: Mental Health Prevention Center
(10) Tailor shop in Hong Kong: Ladies may have a fit upstairs.
(11) At a Safari Park: Elephants please stay in your car.
(12) At a Parisian boutique: Dresses for street walking.
(13) At a zoo in Budapest: Please do not feed the animals. If you have any suitable food, give it to the guard on duty.
(14) At an airline office in Copenhagen: We will take your bags and send them in all directions.

(C) Determine which of the following are statements. Recall that a statement is a sentence that is true or false, not a sentence that may be true or false.
(1) The integer 2019 is even.
(2) $x^5 = 32$
(3) Albertine's cat has three legs.
(4) There exists no real number whose square is -2019.
(5) It will snow in Chicago tomorrow.

(6) Satan exists.
(7) There exists a real number whose cube is 2019.
(8) There is no prime number that is at least as big as 242 but no larger than 250.
(9) Boris' favorite color is blue.
(10) Neither ever nor never goodbye. (lyrics from them of Dark, a German TV series)

(D) List the elements of each of the following sets: (1) $\{x \in \mathbf{R} : x^4 - 1 = 0\}$ (2) $\{x \in \mathbf{Z} : -1/3 < x < 5.99\}$ (3) $\{x \in N \mid x \leq 4\}$
(4) {unicorns| unicorn lives in Illinois} (e) {} (f) {φ} (g) {1, {2}}

(E) Write in set notation: (a) {4, 9, 16, 25, …} (b) {1/1, 1/3, 1/5, 1/7, …} (c) {…1/8, ¼, ½, 1, 2, 4, 8, …}

(F) Determine the cardinality of each set in (1).

(G) Find each of the following cardinalities:

$|\{\{1\},\{2,\{3,4\}\},\varnothing\}|$
$|\{\{1,4\},a,b,\{\{3,4\}\},\{\varnothing\}\}|$
$|\{\{\{1\},\{2,\{3,4\}\},\varnothing\}\}|$
$|\{\{\{1,4\},a,b,\{\{3,4\}\},\{\varnothing\}\}\}|$
$|\{x \in \mathbb{Z} : |x| < 10\}|$

(H) Sketch the following sets of points in the xy-plane.

$\{(x,y) : x,y \in \mathbb{R}, x^2 + y^2 \leq 1\}$
$\{(x,y) : x,y \in \mathbb{R}, y \geq x^2 - 1\}$
$\{(x,y) : x,y \in \mathbb{R}, x > 1\}$
$\{(x, x+y) : x \in \mathbb{R}, y \in \mathbb{Z}\}$
$\{(x, \frac{x^2}{y}) : x \in \mathbb{R}, y \in \mathbb{N}\}$
$\{(x,y) \in \mathbb{R}^2 : (y-x)(y+x) = 0\}$
$\{(x,y) \in \mathbb{R}^2 : (y-x^2)(y+x^2) = 0\}$