

REVIEW SHEET 1, Math 540, Summer 2021, Melody Chan

Due Friday May 14 at 11:59pm Eastern Time

- (1) (Practicing set-builder notation to English) Translate the following into English descriptions of sets as simply and naturally as you can.

Example: $\{x^2 : x \in \mathbb{Q}\}$ is *the set of squares of rational numbers*.

Example: $\{x \in \mathbb{R} : x > 0\}$ is *the set of real numbers that are positive*, or, *the set of positive reals*.

(a) $\{x \in \mathbb{R} : x > 0\} \cup \{x \in \mathbb{R} : x < 0\}$ is

(b) $\mathbb{R} \setminus \mathbb{Q}$ is

(c) $\{\alpha \in \mathbb{C} : \alpha^2 \in \mathbb{Q}\}$ is

(d) $\{(x, y) \in \mathbb{C}^2 : y = -x\}$ is

(e) $\{(x, 2x) : x \in \mathbb{R}\}$ is

(f) $\{(a, b, 0) : a, b \in \mathbb{R}\} \cap \{(x, 0, z) : x, z \in \mathbb{R}\}$ is

- (2) (Practicing English to set-builder notation) Describe each of the following sets using set-builder notation. Don't be afraid to give things names.

Example: The set of ordered triples of complex numbers in which the first equals the second is

$$\{(x, x, y) : x, y \in \mathbb{C}\} \text{ or } \{(a, b, c) \in \mathbb{C}^3 : a = b\},$$

or many other possibilities.

Example: The set of real numbers whose squares are rational numbers is

$$\{x \in \mathbb{R} : x^2 \in \mathbb{Q}\}.$$

(a) The set of real numbers whose cube is an integer.

(b) The set of real numbers whose square is greater than 2.

- (c) The set of rational numbers strictly between 0 and 1.
- (d) The set of ordered pairs of complex numbers in which the second one is i times the first one.
- (e) The set of ordered triples of real numbers in which the third one is zero.
- (f) The set of ordered triples of real numbers in which at least one of the three is zero.
- (g) The set of nonzero complex solutions to the equation $x^5 + 17x^3 - x^2 = 0$.