

Math 120A  
August 7, 2019

**Question 1** Given  $z \in \mathbb{C}$ , it's argument  $\arg(z)$  is

- A. the angle it makes with the positive real axis, with counterclockwise the positive orientation.
- B. the set of real numbers  $t$  for which  $z = |z|e^{it}$ .
- C. the imaginary part of  $\log(z)$ , the logarithm of  $z$ .
- D. **A** and **B**.
- \*E. **A**, **B**, and **C**.

**Question 2**  $\text{Log}(z)$  is

- A. the principal branch of  $\log(z)$ .
- B. equal to  $\log |z| + i\text{Arg}(z)$ , where  $\text{Arg}(z)$  is the principal branch of  $\arg(z)$ .
- C. a set-valued (multivalued) function because  $\text{Arg}(z)$  is a set-valued (multivalued) function.
- \*D. **A** and **B**
- E. **A**, **B**, and **C**.

**Question 3** Why does  $\log(z)$  have branches?

- A.  $e^z$  is periodic.
- B. You have to restrict the domain of  $e^z$  to obtain an invertible function.
- C. There are many choices for a restricted domain on which  $e^z$  is invertible.
- D. None of the above.
- \*E. **A, B, and C.**

**Question 4** Given  $z \in \mathbb{C}$  with  $|z| = 1$ . Then,

- A.  $z = e^{i\phi}$  for some real number  $\phi$ .
- B.  $|\operatorname{Re}(z) + \operatorname{Im}(z)| \leq 1$ .
- C.  $\frac{1}{z} = \bar{z}$
- \*D. **A and C.**
- E. **B and C.**