Math 120A
August 20, 2019

Question 1 A primitive of a continuous function $f : \mathbb{C} \to \mathbb{C}$ is

A. an antiderivative of f.

B. a function $F : \mathbb{C} \to \mathbb{C}$ such that $F'(z) = f(z)$.

C. an exact differential of f.

*D. both **A** and **B**.

E. all of the above.

Question 2 A continuous path $\gamma : [a, b] \to \mathbb{C}$ is simple if

A. $\gamma(b) = \gamma(a)$.

B. $\gamma(t_1) \neq \gamma(t_2)$ whenever $t_1 \neq t_2$.

C. the image curve $\gamma([a, b])$ has no self-intersections.

*D. **B** and **C**.

E. all of the above.

Question 3 A continuous path $\gamma : [a, b] \to \mathbb{C}$ is closed if

*A. $\gamma(b) = \gamma(a)$.

B. $\gamma(t_1) \neq \gamma(t_2)$ whenever $t_1 \neq t_2$.

C. the image curve $\gamma([a, b])$ has no self-intersections.

D. **B** and **C**.

E. all of the above.

Question 4 Let $\gamma : [a, b] \to \mathbb{C}$ be a piecewise smooth path with length L. We can conclude

A. $\left| \int_\gamma dz \right| \le L.$

B. $\int_\gamma |dz| = L.$

C. $\int_a^b |\gamma'(t)|\, dt = L.$

D. **B** and **C**; they are the same.

*E. all of the above.

Question 5 Recall that Log(z) is the principle branch of the logarithm and that $\mathrm{Log}'(z) = \dfrac{1}{z}$ at all points $z \in \mathbb{C}$ where this makes sense. Thus,

A. Log(z) is an antiderivative for $\dfrac{1}{z}$ on the slit plane $\mathbb{C} \setminus (-\infty, 0]$.

B. Log(z) is a primitive for $\dfrac{1}{z}$ on the slit plane $\mathbb{C} \setminus (-\infty, 0]$.

C. Log(z) is a primitive for $\dfrac{1}{z}$ on the punctured plane $\mathbb{C} \setminus \{0\}$ since neither Log(z) nor $\dfrac{1}{z}$ are defined at 0.

*D. **A** and **B**; they are the same.

E. none of the above; slitting or puncturing planes is vandalism and is not allowed.