

Name: _____

Circle the most appropriate response for each.

Chapter 2 Computation

- Let $f(z) = z^2 + \bar{z}$. Find $f(3 - 4i)$.
 - $20 + 9i$
 - $-7 - 20i$
 - $-10 + 9i$
 - None of these.
- Find $\lim_{z \rightarrow i-1} \frac{z^2 + 2z + 2}{z + 1 - i}$.
 - 0
 - $2i$
 - $4 - 3i$
 - None of these.
- Find the value of $\frac{d}{dz} \left[\frac{z^2 + 2z + 2}{z + 1 - i} \right]$ when $z = i$.
 - 1
 - $-i$
 - $2 - 2i$
 - None of these.
- Let $z = x + iy$ and $f(z) = x^2 - y^2 + (2xy)i$. Find $f'(1 + i)$.
 - 3
 - $-4i$
 - $2 + 2i$
 - None of these.
- Let $z = x + iy$ and $f(z) = u(z) + iv(z) = ye^{2ix}$. Find v_x .
 - $2y \cos(2x)$
 - $2x \sin(2y)$
 - $2e^{xy}$
 - None of these.

Chapter 2 Knowledge

Circle the most appropriate response for each.

6. If $\lim_{z \rightarrow z_0} \frac{f(z) - f(z_0)}{z - z_0}$ exists, then f is differentiable at z .
 - A. True
 - B. False
7. There exists a continuous function f such that g defined by $g(z) = -5f(z) + f(z)^2$ is discontinuous at some point.
 - A. True
 - B. False
8. There exists a differentiable function f such that every directional derivative of f exists.
 - A. True
 - B. False
9. The domain of $f(z) = \frac{2}{z + \bar{z}}$ is all complex numbers with a nonzero real part.
 - A. True
 - B. False
10. If f is singular at a point z_0 , then there exists a disk $\{z : |z - z_0| < \epsilon\}$ around that point such that f is non-differentiable at every point in that disk. (Put another way, z_0 is far away from any points at which f is differentiable.)
 - A. True
 - B. False

Chapter 2 Proofs

Prove one (not both) of the following.

11. Prove that $\lim_{z \rightarrow 1} \frac{z-1}{\bar{z}-1}$ does not exist.
12. Prove that $f(z) = \bar{z}^2$ is differentiable at exactly one point.