Module 2 Homework

Quiz, 5 questions

1 point

1.

Let $z = x + iy$ and $z_0 = 3 + 4i$. Which of the following are true? (Check all that apply.)

- [ ] $\lim_{z \to z_0} z^2 - ix + y = -3 + 21i.$
- [ ] $\lim_{z \to z_0} \dfrac{x - 3}{y - 4}$ does not exist.
- [ ] $\lim_{z \to z_0} \dfrac{z - 3 - 4i}{x - 3} = 1.$
- [ ] $\lim_{z \to z_0} \dfrac{z^2 - z(6 + 8i) - 7 + 24i}{z - 3 - 4i} = 1.$

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1 point

2.

Let $f(z) = z^2 + 1$ and $g(z) = z^3$. Which of the following are true? (Check all that apply.)

Note: As in the lectures this week, the notations f^n and g^n denote the nth iterates of f and g, respectively. For example, $f^3 = f \circ f \circ f$.

- [ ] $f^4(i) = 5.$
- [ ] $g^3(i) = i.$
- [ ] $f^3(1) = 25.$
- [ ] $f^2(z) = z^4 + 2z^2 + 2.$

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1 point

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3.

Let $f(z) = z^3$, and consider the sets

$A = \{z \neq 0 \mid 0 < \operatorname{Arg} z < \frac{\pi}{3}\}$,

$B = \{z \neq 0 \mid 0 < \operatorname{Arg} z < \frac{\pi}{6}\}$ and

$C = \{z \neq 0 \mid 0 < \operatorname{Arg} z < \frac{\pi}{2}\}$ as well as the disks

$D = \{z \mid |z| < 1\}$,

$E = \{z \mid |z| < 2\}$,

$F = \{z \mid |z| < 4\}$,

$G = \{z \mid |z| < 6\}$ and

$H = \{z \mid |z| < 8\}$. Which of the following are true? (Check all that apply.)

- [ ] f maps the intersection of the sets A and D onto the set D.
- [ ] f maps the set B onto the set C.
- [ ] Points whose real part is positive and imaginary part is negative are not in the image of the set C under f.
- [ ] For every point w in H there is a point z in the intersection of E and C that is mapped under f to w (i.e. $f(z) = w$).

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1 point

4.

Let $p(z) = z^2 + 6z + 1$ and $\varphi(z) = z + 3$. Compute $f = \varphi \circ p \circ \varphi^{-1}$ (you should obtain a quadratic polynomial of the form $z^2 + c$), and use it to calculate $p^3(\sqrt{i + 5} - 3)$, where $\sqrt{\cdot}$ denotes the principal square root. Note that $p^n = \varphi^{-1} \circ f^n \circ \varphi$. Please enter your answer only (without preceding it by p^3(...) =).

Preview

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5.

Which of the following parameters c are Misiurewicz points? (Check all that apply.)

- [ ] A complex number c with $c \neq 0$ and $c \neq -1$, satisfying $(c^4 + 2c^3 + c^2 + c)^2 = c^2$.
- [ ] $c = -2$
- [ ] A complex number c satisfying $(c^4 + 2c^3 + c^2 + c)^2 = -c$.
- [ ] $c = -1$

I, **Madhu Sreedhar**, understand that submitting work that isn't my own may result in permanent failure of this course or deactivation of my Coursera account.

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