1. It's not necessary to write
   \[ 3 + 0i \text{ or } 0 + 6i, \ 3, 6i \text{ are ok.} \]

2. Alternate approach done
   used \( 12 + a^2 = (z + a)(2 + a) = (z + a)(2 + a) \)
   because \( A \) is real, \( \text{ad} \)
   \[ 12 + b^2 = (2 + b)(2 + b) = (2 + b)(2 + b) \]
   \[ = (2 + b)(2 + b) = 2b + 2b + z b + z b + 2b \]
   \[ = 12 + z b + z b + 1b^2 \]

3. Only 2/10 observed that
   \[ 12 - 1 = \text{Re} z \Rightarrow \text{Re} z = 0. \]

When solving equations with
implications, you may gain
extraneous solutions

4. \[ \cos \frac{\theta}{2} = \sqrt{1 + \cos \theta} \]
   \[ \text{so} \]
   \[ \cos \frac{\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \]
   \[ \cos \frac{\pi}{8} = \sqrt[4]{1 + \frac{i2 + i2}{2}} = \sqrt{1 + \frac{i2 + i2}{2}} \]
   \[ \cos \frac{\pi}{16} = \sqrt{1 + \frac{\sqrt{i2 + i2}}{2}} \]
   \[ = \sqrt{2 + \sqrt{2 + i2}} \]

5. Nobody did it this way, but
   \[ (a + bi)^3 = -8 \implies \]
   \[ a^3 + 3a^2 bi + 3ab^2 i + b^3 i^3 = -8 \]
   \[ \Rightarrow \]
   \[ 2a^3 - 3a b^2 = -8 \] (I)
   \[ 3a b - b^3 = 0 \] (II)
   \[ a^3 - b^3 = 0 \iff b(3a^2 - b^2) = 0. \]

6. I checked with Mathematica

7. Don't divide by zero.
   If \( z = a + bi \), a hard way to
   what I did in #5 will work.

8. Ugly problem; my apologies.

9. This can be done with \( z = a + bi \)
   but it's messy. Note that The last
   equal \[ \frac{1}{r + re^{i \theta}} = \frac{1 - r e^{i \theta}}{2 r e^{i \theta}} \]
   \[ \text{implies} \]
   \[ \frac{1}{r} + re^{i \theta} = \frac{1 + r e^{i \theta}}{2 r e^{i \theta}} \]
   \[ = \frac{\cos \theta - i \sin \theta}{2 r e^{i \theta}} = \frac{1}{2} \frac{1 - \sin \theta}{2 r} \]

   which establishes at all \( \frac{1}{2} + yi \) agree.

10. An alternate way to view the
    problem is using \( a \) to get
    \[ (an + 1) = \begin{bmatrix} 3 & -4 \end{bmatrix} (an) \]
    and practicing your linear
    algebra on this matrix.
    (Hint: try to diagonalized)

11. Overall, this was a
    successful performance
    by gawd.