

HOMEWORK 1 COMPLEX ANALYSIS

KELLER VANDEBOGERT

1. PROBLEMS

(1) a. $i^8 = 1$ b. $i^{11} = -i$ c. $i^{42} = 1$ d. $i^{105} = i$

(2) $(5 - 9i) + (2 - 4i) = 7 - 13i$

(3) $i(5 + 7i) = -7 + 5i$

(4) $(2 - 3i)(4 + i) = 11 - 10i$

(5) $3i + \frac{1}{2-i} = 3i + (2 + i)/5 = \frac{2}{5} + \frac{16}{5}i$

(6) $\frac{2-4i}{3+5i} = \frac{(2-4i)(3-5i)}{34} = -\frac{7}{17} - \frac{11}{17}i$

(7) $\frac{(3-i)(2+3i)}{1+i} = \frac{(3-i)(2+3i)(1-i)}{2} = 8 - i$

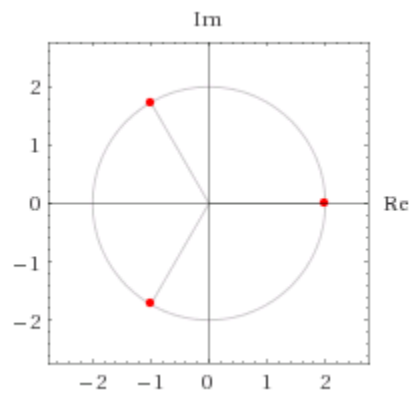
(8) $\frac{(5-4i)-(3+7i)}{(4+2i)+(2-3i)} = \frac{2-11i}{6-i} = \frac{23}{37} - \frac{64}{37}i$

(9) $|(1 - i)^2| = \sqrt{2}^2 = 2$

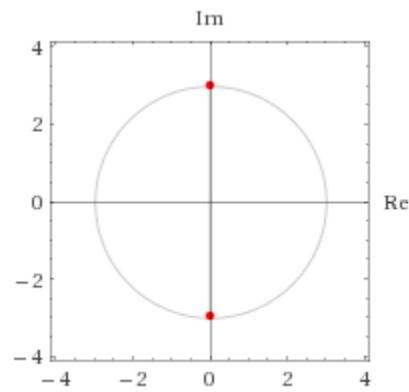
(10) $\left| \frac{2i}{3-4i} \right| = \frac{|2i|}{|3-4i|} = \frac{2}{5}$

(11) Rewrite $8 = 8e^{2\pi i}$. We have three solutions, 2 , $2e^{2\pi i/3}$, and $2e^{4\pi i/3}$

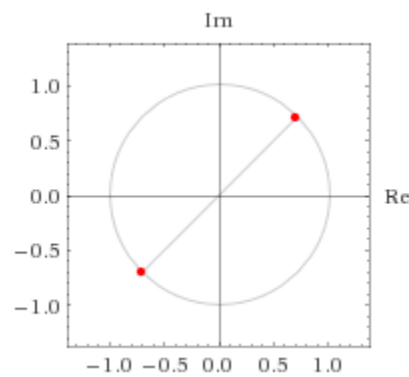
Date: September 3, 2017.



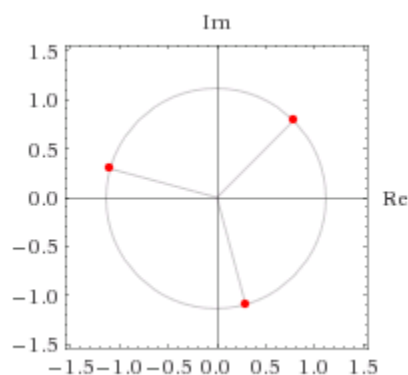
(12) Rewrite $-9 = 9e^{\pi i}$. We have two solutions, $3e^{\pi i/2}$ and $3e^{3\pi i/2}$



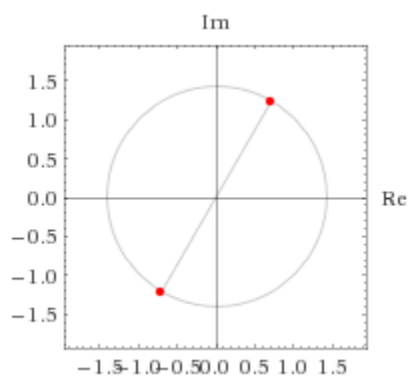
(13) Rewrite $i = e^{i\pi/2}$. We have two solutions, $e^{i\pi/4}$ and $e^{5\pi i/4}$



- (14) Rewrite $-1 + i = 2^{1/2}e^{3\pi i/4}$. We have three solutions, $2^{1/6}e^{i\pi/4}$, $2^{1/6}e^{11\pi i/12}$, and $2^{1/6}e^{19\pi i/12}$



- (15) Rewrite $-1 + \sqrt{3}i = 2e^{2\pi i/3}$. We have two solutions, $\sqrt{2}e^{i\pi/3}$ and $\sqrt{2}e^{4\pi i/3}$



- (16) Rewrite $3+4i = 5e^{i \tan^{-1}(4/3)}$. We have two solutions, $\sqrt{5}e^{i \tan^{-1}(4/3)/2} = 2 + i$ and $\sqrt{5}e^{\pi i + i \tan^{-1}(4/3)/2} = -2 - i$

