NAME MISSING

22

ECE 1250 homework # P0

If you learn to use the complex math feature of your calculator, you may use that to work the following problems. In that case you may report the answers without showing any work. Otherwise, you'll need more space than is provided here.

1. **Convert the following complex numbers to polar form ($m\angle\theta$ or $me^{j\theta}$).**

   a) $1+j$ b) $2.6+8.7j$ c) $3+4j$ d) $3-4j$ e) $-3+4j$ f) $-3-4j$

2. **Convert the following complex numbers to rectangular form (a + bj).**

   a) $10\cdot e^{j\cdot 60\cdot deg}$ b) $0.4\cdot e^{j\cdot 12\cdot deg}$ c) $1500\cdot e^{j\cdot\frac{\pi}{2}\cdot rad}$ d) $10\cdot e^{-j\cdot 45\cdot deg}$ e) $20\cdot e^{j\cdot 120\cdot deg}$ f) $30\cdot e^{j\cdot 210\cdot deg}$

3. **Perform the following additions and subtractions of complex numbers.**

   a) $(3+2j)+(6+9j)$ b) $(9-10j)-(9+10j)$ c) $(-2-2j)+(-6+9j)$

   d) $(3+0j)-(0+9j)$ e) $(5+6j)+5\cdot e^{j\cdot 53\cdot deg}$ f) $(-2+3j)-8\cdot e^{-j\cdot 37\cdot deg}$

4. **Perform the following multiplications of complex numbers.**

   a) $(8+j)\cdot 3$ b) $(3+2j)\cdot j$ c) $\left(20\cdot e^{j\cdot 40\cdot deg}\right)\cdot\left(10\cdot e^{j\cdot 60\cdot deg}\right)$

   d) $(-6+9j)\cdot\left(10\cdot e^{j\cdot 60\cdot deg}\right)$ e) $(-2-j)\cdot(-6-9j)$

5. **Perform the following divisions of complex numbers.**

   a) $\dfrac{20\cdot e^{j\cdot 40\cdot deg}}{10\cdot e^{j\cdot 60\cdot deg}}$ b) $\dfrac{9-10j}{3\cdot e^{-j\cdot 20\cdot deg}}$ c) $\dfrac{3+0j}{0+9j}$ d) $\dfrac{-2-2j}{-6+9j}$

Answers

1. a) $1.414\cdot e^{j\cdot 45\cdot deg}$ b) $9.08\cdot e^{j\cdot 73.4\cdot deg}$ c) $5\cdot e^{j\cdot 53.1\cdot deg}$ d) $5\cdot e^{-j\cdot 53.1\cdot deg}$ e) $5\cdot e^{j\cdot 126.9\cdot deg}$ f) $5\cdot e^{-j\cdot 126.9\cdot deg}$
2. a) $5+8.66\cdot j$ b) $0.391+0.083\cdot j$ c) $1500\cdot j$ d) $7.071-7.071\cdot j$ e) $-10+17.321\cdot j$ f) $-25.981-15\cdot j$
3. a) $9+11\cdot j$ b) $-20\cdot j$ c) $-8+7\cdot j$ d) $3-9\cdot j$ e) $8.009+9.993\cdot j$ f) $-8.389+7.815\cdot j$
4. a) $24+3\cdot j$ b) $-2+3\cdot j$ c) $200\cdot e^{j\cdot 100\cdot deg}$ d) $108\cdot e^{-j\cdot 176\cdot deg}$ e) $24.2\cdot e^{j\cdot 82.9\cdot deg}$
5. a) $2\cdot e^{-j\cdot 20\cdot deg}$ b) $4.485\cdot e^{-j\cdot 28.01\cdot deg}$ c) $0.333\cdot e^{-j\cdot 90\cdot deg}$ d) $-0.051+0.256j$

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