University of Lethbridge
Department of Mathematics and Computer Science
7th February, 2017, 1:45 - 2:55 pm
MATH 1410A - Test #1

Last Name:_____

First Name:_____

Student Number:_____

Tutorial Time: _____

Record your answers below each question in the space provided. Left-hand pages may be used as scrap paper for rough work. If you want any work on the left-hand pages to be graded, please indicate so on the right-hand page.

To earn partial credit, you must show your work. Correct answers without adequate justification in most cases do not receive full marks.

No external aids are allowed, with the exception of a 5-function calculator.

For grader's use only:

Page	Grade
2	/12
3	/12
4	/12
5	/12
6	/12
Total	/60

1. True/False problems: for each statement below, indicate if it is true or false. If it is true, explain why. If it is false, give an example where the statement fails to hold. (Remember that "true" means true **in general**. A statement is false if it fails in even one case.)

[3] (a) For any complex numbers z and w, $|z+w| = |z| + |w|$.

[3] (b) For any complex numbers z and w, $\overline{z+w} = \overline{z} + \overline{w}$.

[3] (c) If $\vec{a} \cdot \vec{b} = 0$ for two vectors $\vec{a}, \vec{b}$ in $\mathbb{R}^2$, then either $\vec{a} = \vec{0}$, or $\vec{b} = \vec{0}$.

[3] 2. Define what it means for a vector $\vec{v}$ in $\mathbb{R}^3$ to be a **unit vector**.

3. Given the complex numbers $z = 4 + 5i$ and $w = -2 + 3i$, compute the following. You do not need to explain your work.

[2] (a) $z + w$

[2] (b) $\overline{z}$

[2] (c) $|w|$

[3] (d) zw

[3] (e) $\dfrac{z}{w}$

4. Given the vectors $\vec{v} = \langle 4, 3, -5 \rangle$ and $\vec{w} = \langle -2, 1, 0 \rangle$, compute the following. You do not need to explain your work.

[2] (a) $2\vec{v} - 5\vec{w}$

[2] (b) $\|\vec{v}\|$

[2] (c) $\vec{v} \cdot \vec{w}$

[3] (d) $\vec{v} \times \vec{w}$

[3] (e) $\text{proj}_{\vec{v}} \vec{w}$

[3] 5. (a) Convert the complex number $z = -1 + \sqrt{3}\,i$ to polar form.

[2] (b) Convert the complex number $w = 4e^{i(\pi/4)}$ to rectangular form.

[4] (c) Compute the value of z^8, where z is as given in part (a).
Express your answer in rectangular form.

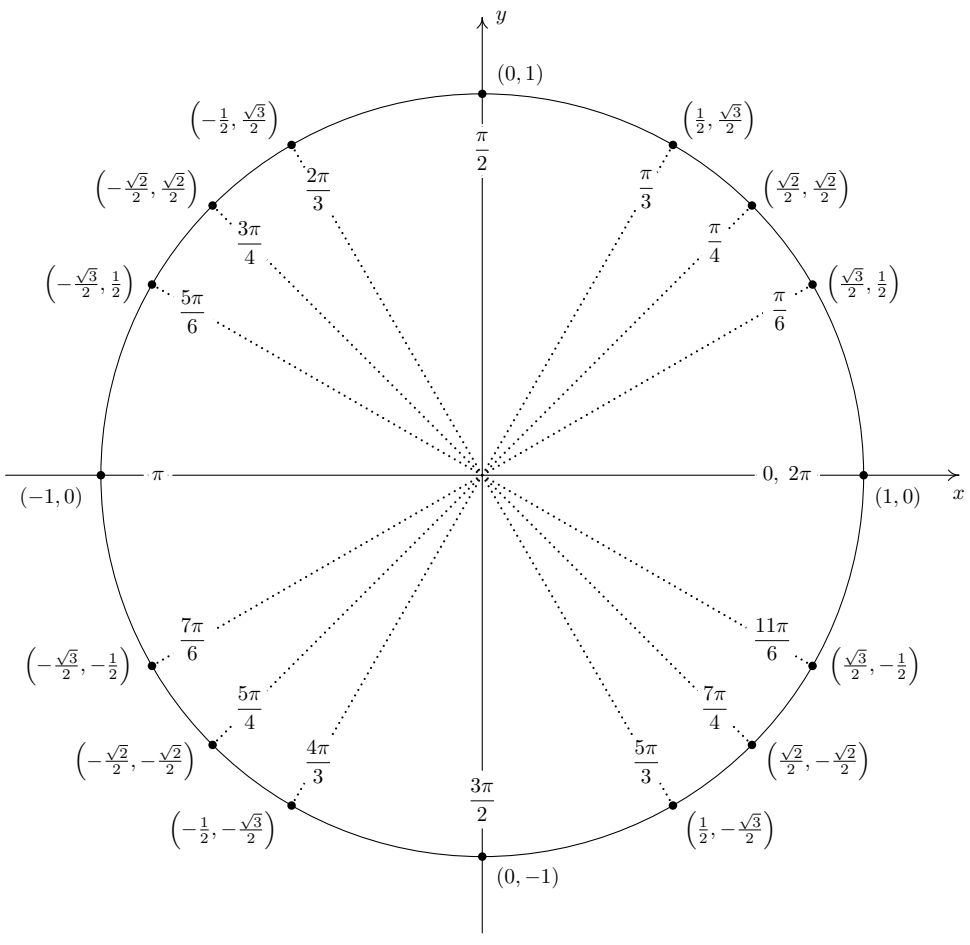
[3] (d) Compute the value of $\dfrac{z^2}{w^3}$, where z and w are as given in parts (a) and (b).
Express your answer in polar form.

6. (a) Find the vector equation of the line ℓ that passes through the points $P = (3, 2, -4)$ and $Q = (5, 1, 2)$. [3]

(b) Find the scalar equation of the plane $\mathcal{P}$ that passes through the points $A = (1, -2, 4)$, $B = (3, 0, 5)$, and $C = (1, -1, 2)$. [5]

(c) Find the point of intersection between the line ℓ and the plane $\mathcal{P}$ determined above. [4]

Extra space for rough work. You may remove this page.



 Total Points: 60