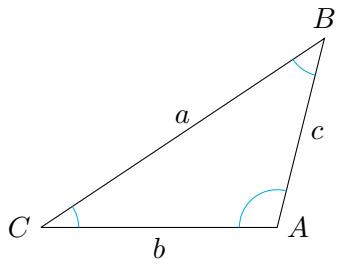
Test 2, Winter 2022

Name: _____ **Student #:** _____

For first two problems consider a triangle with the following angles and sides (the picture below is of a generic triangle to set the notation).



Question 1

(2.5 marks) $A = 35°$, $b = 310$, $a = 180$. Determine The angles B and C and the side c.

Question 2

(2.5 marks) Given that $a = 13$, $b = 17$ and $c = 24$ determine the angles A, B and C.

Question 3

(2.5 marks) Given two impedance phasors $Z_1 = 4\angle 25° k\Omega$ and $Z_2 = 3\angle -115° k\Omega$, determine the resulting phasor (add them and get the result in polar coordinates). Draw the three phasors on the Cartesian plane.

Question 4

(3 marks) Consider the phasors $V_1 = 54\angle 0°$ and $V_2 = 48\angle 104°$. The phasors V_1 and V_2 are added to make the phasor $V_T = V_1 + V_2$. Determine the magnitude and the phase angle of V_T in two different ways:

1. By using the law of sines and the law of cosines.

2. By rewriting the phasors in Cartesian coordinates, adding them and then converting back to polar coordinates.

Question 5

(2.5 marks) Complete the following operations and simplify:

(a) $(3-j)(1-2j)+j(3-4j)$

(b) $\frac{1-5j}{2+3j}$

(c) $\dfrac{1-2j}{2j}+\dfrac{3}{3-j}=$

Question 6

(2 marks) Add the complex phasors and express the answer in polar form: $5\angle 93^\circ + 1.5\angle -10^\circ$

Question 7

(3 marks) Perform the operations and express the answer in polar form.

(a) $\frac{12\angle 120^\circ}{1.5\angle 46^\circ} + (8\angle 145^\circ)(2\angle 60^\circ)$

(b) $(1-j)\frac{3-j}{4+j} =$

Question 8

(2.5 marks) The total impedance of an ac circuit containing two impedances Z_1 and Z_2 in parallel is given by

$$Z_T = \frac{Z_1 Z_2}{Z_1 + Z_2}$$

Find Z_T in polar form when $Z_1 = 26\angle 120^\circ\ k\Omega$ and $Z_2 = 13\angle -30^\circ\ k\Omega$.