ENGG104 Tutorial 9 **Class Questions**

Team Name: _____

Question 1

Convert the following from rectangular to polar form:

a. $4 + j\,3$ b. $2 + j\,2$
c. $4 + j\,12$ d. $1000 + j\,50$
e. $-1000 + j\,4000$ f. $-0.4 + j\,0.8$

Question 2

Convert the following from polar to rectangular form:

a. $6\,\angle 40°$ b. $12\,\angle 120°$
c. $2000\,\angle -90°$ d. $0.0064\,\angle +200°$
e. $48\,\angle 2°$ f. $5 \times 10^{-4}\,\angle -20°$

Question 3

Perform the following additions in rectangular form:

a. $(4.2 + j\,6.8) + (7.6 + j\,0.2)$

b. $(142 + j\,7) + (9.8 + j\,42) + (0.1 + j\,0.9)$

c. $(4 \times 10^{-6} + j\,76) + (7.2 \times 10^{-7} - j\,5)$

Question 4

Perform the following operations with polar numbers, and leave the answer in polar form:

a. $6 \angle 20° + 8 \angle 80°$

b. $42 \angle 45° + 62 \angle 60° - 70 \angle 120°$

c. $20 \angle -120° - 10 \angle -150° + 8 \angle -210° + 8 \angle +240°$

Question 5

Perform the following multiplications in polar form:
a. $(2 \angle 60°)(4 \angle -40°)$
b. $(6.9 \angle 8°)(7.2 \angle -72°)$
c. $(0.002 \angle 120°)(0.5 \angle 200°)(40 \angle +80°)$

Perform the following divisions in polar form:
a. $(42 \angle 10°)/(7 \angle 60°)$
b. $(0.006 \angle 120°)/(30 \angle +60°)$
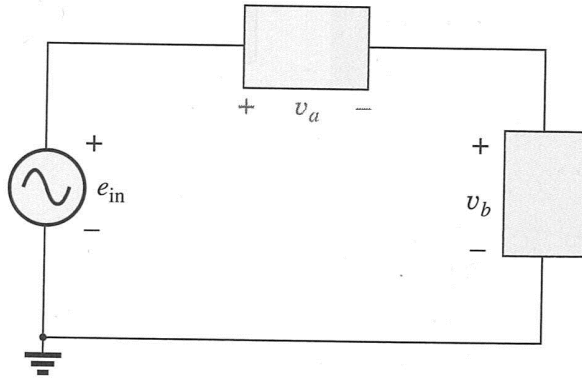c. $(4360 \angle -20°)/(40 \angle -210°)$

Question 6

Express the following in phasor form:
a. $\sqrt{2}(160)\sin(\omega t + 30°)$
b. $\sqrt{2}(25 \times 10^{-3})\sin(157t - 40°)$
c. $100 \sin(\omega t - 90°)$

Question 7 [past exam question]

For the system in Fig. 14.84, find the sinusoidal expression
for the unknown voltage v_a if

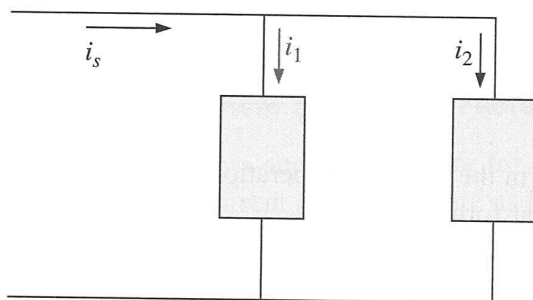$$e_{in} = 60 \sin(377t + 45°)$$
$$v_b = 20 \sin(377t - 45°)$$

Question 8

For the system in Fig. 14.85, find the sinusoidal expression
for the unknown current i_1 if

$$i_s = 20 \times 10^{-6} \sin(\omega t + 60°)$$
$$i_2 = 6 \times 10^{-6} \sin(\omega t - 30°)$$

FIG. 14.85
Problem 56.