

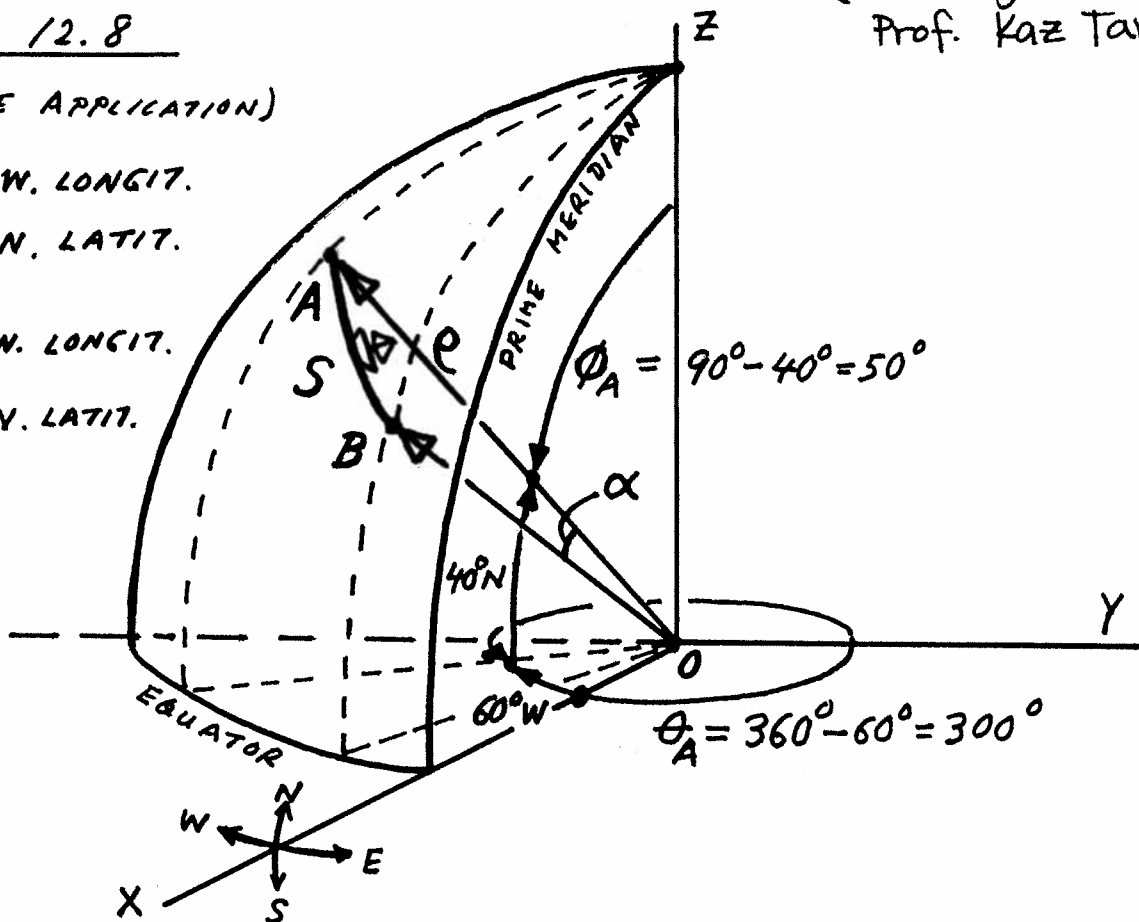
SECTION 12.8

(courtesy of Prof. Kaz Tarui)

(#51) (NICE APPLICATION)

A { 60° W. LONGIT.
40° N. LATIT.

B { 40° W. LONGIT.
20° N. LATIT.



• STEP 1 (GET SPHER. COORD'S OF A AND B.)

A { rho = 6370 km
theta_A = 360° - 60° = 300°
phi_A = 90° - 40° = 50°
(6370, 300°, 50°)
rho theta_A phi_A

B { rho = 6370 km
theta_B =
phi_B =
(6370, theta_B, phi_B)

• STEP 2 (GET RECTANG. COORD'S OF A AND B.)

A { X = rho sin phi cos theta = 6370 sin 50° cos 300° = 2439.8515
Y = rho sin phi sin theta = 6370 sin 50° sin 300° = -4225.9468
Z = rho cos phi = 6370 cos 50° = 4094.5571
(2439.8515, -4225.9468, 4094.5571)
X Y Z

B { X =
Y =
Z =
(, ,)

- STEP 3 (FIND VECTORS \vec{OA} AND \vec{OB} .)

$$\vec{OA} = \langle 2439.8515, -4225.9468, 4094.5571 \rangle$$

$$\vec{OB} = \langle$$

- STEP 4 (FIND ANGLE α BETW. \vec{OA} AND \vec{OB} .)

$$\cos \alpha = \frac{\vec{OA} \cdot \vec{OB}}{\|\vec{OA}\| \|\vec{OB}\|} \Rightarrow \alpha = .45948 \text{ RAD.}$$

- STEP 5 (FIND S , ARC LENGTH BETW. A AND B, ASSUMING THAT THE ARC IS PART OF THE GREAT CIRCLE PASSING THROUGH A AND B.)

$$S = R\alpha = (6370 \text{ KM})(.45948) \approx 2927 \text{ KM}$$