

CBEPS C1 Exam 2025 Spring Formula Sheet

(1) For the curl of a vector field $\mathbf{F}(x, y, z) = P\mathbf{i} + Q\mathbf{j} + R\mathbf{k}$:

$$\nabla \times \mathbf{F} = \det \begin{bmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ P & Q & R \end{bmatrix}$$

(2) For Cramer's rule, if $AX = B$ is a system of linear equations, then each component of the solution is:

$$x_i = \frac{\det(A_i)}{\det(A)}$$

where A_i is the matrix formed by replacing the i th column of A with B .

(3) For spherical triangles.

(a) Law of cosines for spherical triangles (ϕ for latitude, λ for longitude, c for angular distance):

$$\cos c = \sin \phi_1 \sin \phi_2 + \cos \phi_1 \cos \phi_2 \cos(\lambda_2 - \lambda_1)$$

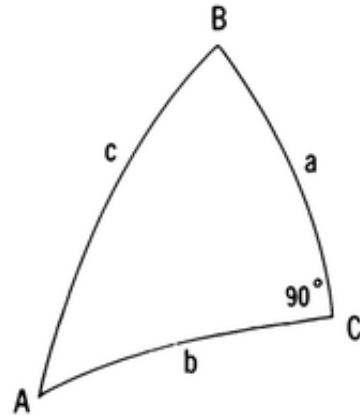
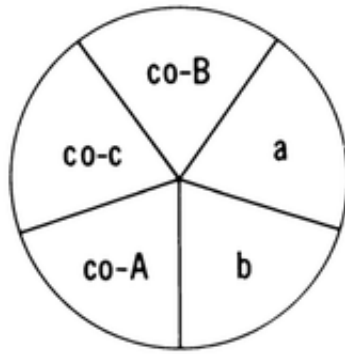
(b) Law of quadrants for right spherical triangles.

LoQ I An angle and its opposite side are in the same quadrant.

LoQ II If any two of the three sides are in the same quadrant, the third side is in the first quadrant.

LoQ III If any two sides are in different quadrants, the third side is in the second quadrant.

(c) Napier's Pentagram:



- *Rule I:* The sine of any circular part is equal to the product of the tangents of the two parts adjacent to it.
- *Rule II:* The sine of any circular part is equal to the product of the cosines of the two parts opposite to it.