Assignment 7

Group Name- **MinTech Enthusiasts**

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Exercise 8.6

Suppose a semivariogram has range of 4, sill of 20, and a nugget of 2.

1. Write an expression for the variogram using the spherical model given by Equation 8.44. Hint: substitute the values given into the equation so that it is only function of h.
2. Sketch a graph of the semivariogram.
3. Write an expression for the covariance as a function of h.
4. Draw a graph of the covariogram.

$$\gamma(h) = \begin{cases} 0 & \text{when } h = 0 \\ \gamma(0^+) + [c(0) - \gamma(0^+)]\left(\dfrac{3h}{2a} - \dfrac{h^3}{2a^3}\right) & \text{when } 0 < h \le a \\ \gamma(0^+) + [c(0) - \gamma(0^+)] = c(0) & \text{when } h > a \end{cases} \tag{8.44}$$

Q. Given

$$\gamma(h) = \begin{cases} 0 & h=0 \\ \gamma(0^+) + [c(0) - \gamma(0^+)]\left(\frac{3h}{2a} - \frac{h^3}{2a^3}\right) & 0<h\le a \\ \gamma(0^+) + [c(0) - \gamma(0^+)] = c(0) & h>a \end{cases}$$

Here, nugget $= \gamma(0^+) = 2$

Sill of range $\Rightarrow c(0) = 20$ & $a = 4$

So, by putting the values

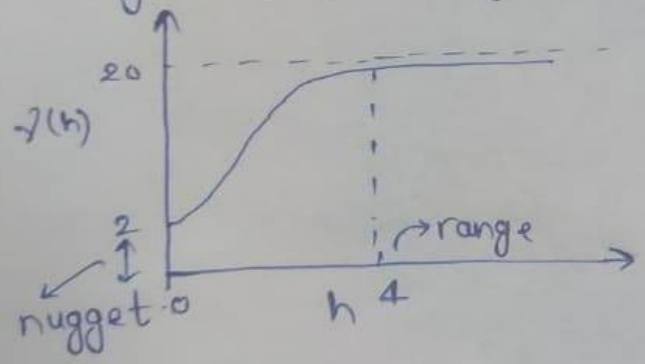
for $0 < h \le a$

$$\gamma(h) = 2 + [20-2]\left(\frac{3h}{8} - \frac{h^3}{2\times 64}\right)$$

$$= 2 + \frac{18}{2}\left(\frac{3h}{4} - \frac{h^3}{64}\right)$$

$$= 2 + 9\left(\frac{3h}{4} - h^3/64\right)$$

The graph of semivariogram



$\Longrightarrow$ Covariance Eqn

$$C(h) = C(0) - \gamma(h)$$

$$= 20 - \left(2 + 9\left(\frac{3h}{4} - \frac{h^3}{64}\right)\right)$$

$$C(h) = 18 - \frac{27h}{4} + \frac{9h^3}{64}$$

$\Longrightarrow$ Graph of co-variogram.