La Scuola d'Italia / Huson / IB Math: Bivariate Statistics

29 October 2025

2.1 Classwork: Stats intro; markdown solutions due Friday 31 October

1. Given a geometric sequence with $u_1 = 9$ and $r = \frac{4}{3}$

   1. Find u_8.

   Solution: $u_8 = 9 \cdot \left(\frac{4}{3}\right)^{8-1}$

   $= \frac{16384}{243} = 67.42386\ldots \approx 67.4$

   2. Find S_8, the sum of the first eight terms of the sequence.

   Solution: $S_8 = 9 \cdot \dfrac{\left(\frac{4}{3}\right)^8 - 1}{\frac{4}{3} - 1}$

   $= \frac{58975}{243} = 242.695\ldots$

   ≈ 243

   3. $S_k \approx 825.37$. Find k algebraically.

   Solution:

$$S_k = 9 \cdot \frac{\left(\frac{4}{3}\right)^k - 1}{\frac{4}{3} - 1} = 825.37$$

$$\left(\frac{4}{3}\right)^k = 36.5693\ldots$$

$$k = \log_{\frac{4}{3}} 36.5693\ldots$$

$$\approx 12$$

2. Consider the following set of data:

x	2	4	6	8	10
y	3	7	5	11	14

   1. Write down the coordinates of the mean point $(\bar{x}, \bar{y})$.
   2. A linear regression of y on x gives the equation $y = ax + b$. Write down the values of a and b.
   3. Write down the value of r , the Pearson's product-moment correlation coefficient for this set of data.
   4. Characterize the correlation coefficient by choosing one of the following: strong positive correlation, weak positive correlation, no correlation, weak negative correlation, strong negative correlation.

3. Find each value as an integer (no calculator).

    1. $\log_3 27$
    2. $\log_3 9 + \log_3 3$
    3. $\log_3 9 - \log_3 81$

4. Consider the following set of data:

x	15	25	35	50	65	80
y	480	440	420	360	310	270

    1. Write down the coordinates of the mean point $(\bar{x}, \bar{y})$.
    2. A linear regression of y on x gives the equation $y = ax + b$. Write down the values of a and b.
    3. Write down the value of r , the Pearson's product-moment correlation coefficient for this set of data.
    4. Characterize the correlation of the data.

5. Three consecutive terms of a geometric sequence are $x - 1$, 4, and $x + 5$. Find the possible values of x.

6. Find each value as an integer (no calculator).

    1. $\log_3 27$
    2. $\log_3 9 + \log_3 3$
    3. $\log_3 9 - \log_3 81$

7. Solve $\log_2 x + \log_2(x - 6) = 4$ for $x > 6$.