MSE Hand in 1

The assignments are to be solved in pairs. Each pair can only hand in one solution.
Submission by the end of class.
The assignments must be solved by hand.

Assignment 1

Rearrange each of the formulas below such that x becomes the subject

(a) $4 = e^x + y$

(b) $y = 10^{z+1/x}$

(c) $10 = \ln(5x)^2$

(d) $k + 1 = \log_2\left(\frac{n \cdot x}{2}\right)$

Assignment 2

The error associated with statistical uncertainty is given by

$$E = Z_{1-\alpha}\frac{\sigma}{\sqrt{n}}$$

where $Z_{1-\alpha}$ is the z-score associated with the standard normal distribution, σ is the standard deviation and n is the sample size.

(a) Rearrange the above formula such that sample size becomes the subject subject

(b) Assuming a z-score of 1.96, and standard deviation of 2, what sample size is needed in order to have an error of no more than 0.5?

Assignment 3

Find the greatest common divisor and the least common multiple of the pairs of integers below

(a) $2^2 \cdot 3^3 \cdot 5^5$ and $2^5 \cdot 3^3 \cdot 5^2$

(b) $2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13$ and $2^{11} \cdot 3^9 \cdot 11 \cdot 17^{14}$

For two positive integers a and b the product can be calculated as $a \cdot b = \gcd(a, b) \cdot \mathrm{lcm}(a, b)$

(c) Verify that the rule holds for the integers in (a) and (b).

(d) If the product of two integers is $2^7 3^8 5^2 7^{11}$ and their greatest common divisor is $2^3 3^4 5$ what is their least common multiple?

Assignment 4

Find the values

(a) $231 \mod 12$

(b) $88 \mod 12$

(c) $599 \mod 9$

(d) $400 \mod 9$

Use (a)-(d) to do the following

(e) Check if $(231 + 88) \mod 12 = (231 \mod 12 + 88 \mod 12) \mod 12$

(f) Check if $(599 + 400) \mod 9 = (599 \mod 9 + 400 \mod 9) \mod 9$

Actually the rule holds for any sum of integers $(a + b) \mod m$.