11. Newton's law of universal gravitation tells us that the force exerted by one particle on another is

\[ F = \frac{G m_1 m_2}{r^2} \]

where the universal gravitational constant is found experimentally to be

\[ G = 6.673 \times 10^{-11} \text{ N m}^2/\text{kg}^2. \]

The mass of each object is \( m_1 \) and \( m_2 \), respectively, and \( r \) is the distance between the two particles. Use Newton's law of universal gravitation to find the force exerted by the earth on the moon, assuming that

- the mass of the earth is approximately \( 6 \times 10^{24} \text{ kg} \),
- the mass of the moon is approximately \( 7.4 \times 10^{22} \text{ kg} \), and
- the earth and the moon are an average of \( 3.9 \times 10^8 \text{ m} \) apart.

12. We know the earth and the moon are not always the same distance apart. Find the force the moon exerts on the earth for 10 distances between \( 3.8 \times 10^8 \text{ m} \) and \( 4.0 \times 10^8 \text{ m} \).

*produce table & plot

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