

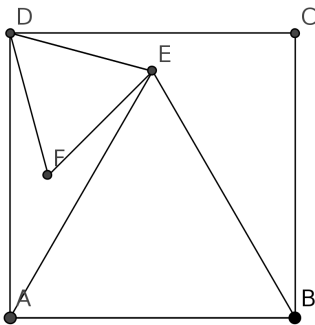
Problems of the Month

University of Louisiana at Lafayette

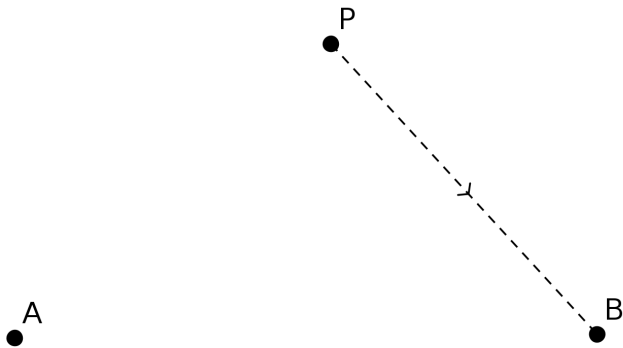
September, 2016

Solutions must be submitted by 10/01/2016. They can be emailed or handed in to Calvin Berry (cberry@louisiana.edu) or Leonel Robert (lrobert@louisiana.edu).

1. In the figure below $ABCD$ is a square and ABE and DEF are equilateral triangles. Show that the distance from A to F is equal to the length of DE .



2. A and B are two different points. Find the set of points P with the following property: if one travels from P to B along a straight line, then the distance from P to A always increases.



3. Show that the series

$$\sum_{n=2}^{\infty} \frac{(-1)^n}{\sqrt{n}(\ln n)^t}$$

converges conditionally, but not absolutely, for all real t .

4. Suppose an elevator starts with six passengers and stops at eight floors. If every passenger is equally likely to get off at each floor and all the passengers leave independently, what is the probability that no two passengers will get off at the same floor?

5. The United States Senate contains two senators from each of the 50 states. The current (September 2016) senators from Louisiana are David Vitter and Bill Cassidy.

a) If a committee of eight senators is selected at random, what is the probability that it will contain David Vitter?

a) If a committee of eight senators is selected at random, what is the probability that it will contain at least one of the Louisiana senators?

c) If a committee of 50 senators is selected at random, what is the probability that it will contain one senator from each state?