Exercise 1: Definitions. For each of the following, define the term and stat its importance in statistics (spatial statistics if the term is specific to spatial stats). (I expect 2-3 sentences for each of these, no more.)

  (a) edge effects (for point pattern data)

     Solution:

  (b) CSR (complete spatial randomness)

     Solution:

  (c) Monte Carlo tests (also, why are they so useful when working with point pattern data?)

     Solution:

Exercise 2: We model CSR using a spatial Poisson process (for point pattern data). Consider a rectangular region R with $0 \geq x \geq 3$ and $0 \geq y \geq 2$.

(a) If the intensity for a (homogenous) Poisson process in this region is given by $\lambda(x, y) = 1.4$,

     i. What is the distribution of $N(R)$, the number of events in the region?

        Solution:

     ii. Find $P(N(R)) = 12$, the probability that there are 12 events in the region.

        Solution:

(b) If the intensity of the inhomogeneous Poisson process in this region is $\lambda(x, y) = x + y$,

     i. Calculate $\gamma = \iint_R \lambda(x, y) dx dy$

        Solution:

     ii. Find the distribution of $N(R)$

        Solution:

     iii. What is the expected number of event sin the region R?

        Solution: