Math 253 GWS 3 - 8.2 Series Applications Name:_____

1. To control an agricultural pest called the medfly (Mediterranean fruit fly), N sterilized male flies are released into the general fly population every day. If s is the proportion of these sterilized flies that survive a given day, then $N \cdot s^k$ of the first N released will survive for k days. [This is not how many there are after k days, only how many of the initial released are left after k days.]

   a. How many sterile flies are there after n days? What happens in the long run?

   b. If $s = 0.9$ and 10,000 sterilized males are needed to control the medfly population in a given area, how many should be released every day?

2. The Fibonacci sequence was defined in Section 8.1 by the equations

$$f_1 = 1, \qquad f_2 = 1, \qquad f_n = f_{n-1} + f_{n-2} \text{ for } n \geq 3$$

Show that each of the following are true:

a. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{f_{n-1} f_{n+1}} = 1$

b. $\displaystyle\sum_{n=2}^{\infty} \frac{f_n}{f_{n-1} f_{n+1}} = 2$

3. In the figure there are infinitely many circles approaching the vertices of a square with side lengths of 2. Determine the total area of the circles.