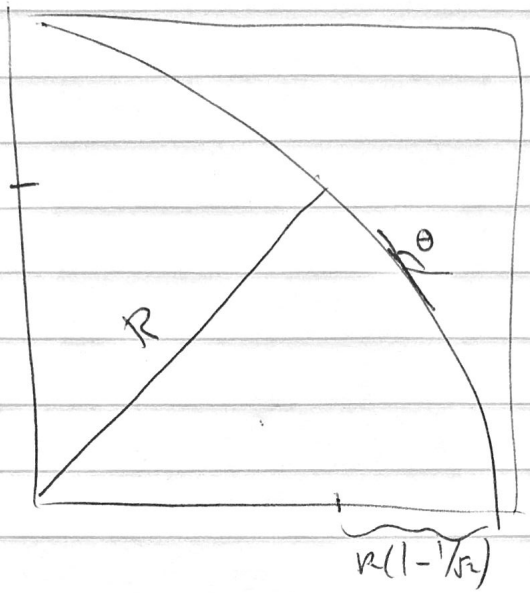
Fraction of Type 1 & 2 segments

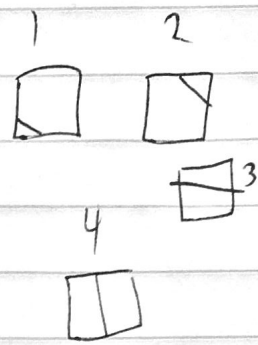
8/7/18

Consider only 1st octant. No type-3 squares.

The slope in 1st octant sector is

$$\frac{\pi}{2} \le \theta \le \frac{3\pi}{4}$$

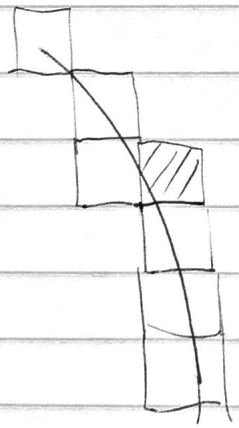




4 has slope

What is the fraction of Type 4 vs type 1 & 2?

y coordinate increases by 1 for each square, total $R/\sqrt{2}$.
x coordinate decreases by $R\left(1-\frac{1}{\sqrt{2}}\right)$ total.



We only get type 1 or 2 when x decreases by 1.

Hence, in first octant,

$$\#\{\text{type 1 or 2}\} = R\left(1-\frac{1}{\sqrt{2}}\right)$$

$$\text{Fraction of type 1 or 2} = \frac{R\left(1-\frac{1}{\sqrt{2}}\right)}{R/\sqrt{2}} = 0.4142135$$

Seems to agree with numerics!