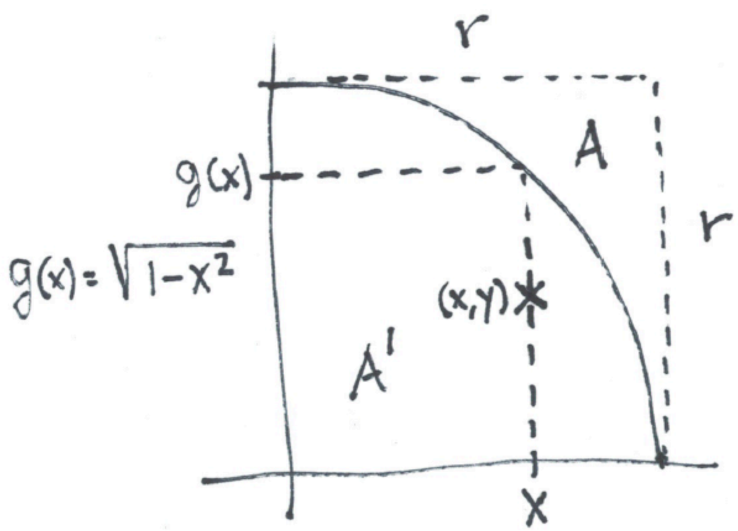
Warm up "Monte Carlo" homework this week

Calculate π to arbitrary precision



$$A' = \frac{\pi r^2}{4}$$

$$A = r^2$$

Throw "darts" within A by calling random # generator twice $\Rightarrow (x, y)$ } uniform distribution expected

Naturally, $$\frac{\#\text{ darts landing within } A'}{\#\text{ darts thrown} \equiv N} = \frac{\frac{\pi r^2}{4}}{r^2} = \frac{\pi}{4}$$

Programatic condition for landing within A' is $y \leq g(x)$

How does "π" quality depend on N? $\Rightarrow \sim \frac{1}{\sqrt{N}}$ expected

Calculate the value of pi using the method described in class (hit-and-miss on a quadrant of a circle, circumscribed by a square). How fast do we converge to the actual value? (as a function of number of trials, N). Is it similar to the $N^{-1/2}$ dependence discussed in class? You can make the precision arbitrarily high, but what about the accuracy?