

4-18-12

4-18-(68)

Bob = \$10

Mike = \$30

$$r_n = q r_{n-1} + p r_{n+1} \quad T_n = \frac{(q/p)^n - (q/p)^N}{1 - (q/p)^N}$$

N = 40

n = 10

$$p = .50 \quad q = .50 \quad r_n = \frac{(p/q)^{10} - (p/q)^{40}}{1 - (p/q)^{40}} = \lim_{p \rightarrow q} \frac{(p/q)^{10} - (p/q)^{40}}{1 - (p/q)^{40}}$$

$$= \lim_{p \rightarrow q} \frac{(-\frac{p^{10}}{q^{40}} + \frac{1}{q^{30}})(p^{30} + p^{20}q^{10} + p^{10}q^{20})}{(-\frac{p^{10}}{q^{40}} + \frac{1}{q^{30}})(p^{30} + p^{20}q^{10} + p^{10}q^{20} + q^{30})} = \lim_{p \rightarrow q} \frac{p^{30} + p^{20}q^{10} + p^{10}q^{20}}{p^{30} + p^{20}q^{10} + p^{10}q^{20} + q^{30}} = \boxed{\frac{3}{4}}$$

$$p = .49 \quad q = .51 \quad r_n = \frac{(.51/.49)^{10} - (.51/.49)^{40}}{1 - (.51/.49)^{40}} = \boxed{0.876}$$

$$p = .45 \quad q = .55 \quad r_n = \frac{(.55/.45)^{10} - (.55/.45)^{40}}{1 - (.55/.45)^{40}} = \boxed{0.998}$$

4-18-(69)

5¢ bet instead of 1¢ bet, meaning steps are 5x bigger and
 n = \$10 / 5 = 2 that gamblers have 5x less
 N = \$40 / 5 = 8 money to game with.

$$p = .50 \quad q = .50 \quad r_n = \lim_{q \rightarrow p} \frac{(q/p)^2 - (q/p)^8}{1 - (q/p)^8} = \frac{q^{30} + q^{20}p^{10} + q^{10}p^{20}}{q^{30} + q^{20}p^{10} + q^{10}p^{20} + q^{30}} = \boxed{\frac{3}{4}}$$

$$p = .49 \quad q = .51 \quad r_n = \frac{(.51/.49)^2 - (.51/.49)^8}{1 - (.51/.49)^8} = \boxed{.779}$$

$$p = .45 \quad q = .55 \quad r_n = \frac{(.55/.45)^2 - (.55/.45)^8}{1 - (.55/.45)^8} = \boxed{0.876}$$

