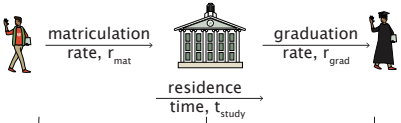
(A)

LITTLE'S THEOREM — CALCULATING POPULATIONS FROM RATES AND LIFETIMES

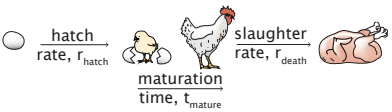
student body population



assuming $r_{mat} \approx r_{grad}$

student body, $N_{student} \approx t_{study} \times r$

livestock standing population



assuming $r_{birth} \approx r_{death}$

standing population, $N_{chicken} \approx t_{mature} \times r$

(B)

ESTIMATING STANDING CHICKEN POPULATION

LAYING

egg mass, $m_{egg}^{(chicken)} \approx \frac{f \times 10^{2}\ eggs}{chicken} \times \frac{f \times 10^{-2}\ kg}{egg}$

$\approx$ 10 kg / chicken

laying chicken lifespan, $t_{chicken}^{(laying)} \approx$ 1.5 years

laying population, $N_{chicken}^{(laying)} \approx \frac{10^{11}\ kg}{year} \times \frac{1\ chicken}{10\ kg} \times 1.5\ year$

$\approx$ 1.5×10^{10} egg-laying chicken

POULTRY

poultry mass, $m_{poultry}^{(chicken)} \approx \frac{f\ kg}{chicken}$

poultry maturation time, $t_{chicken}^{(poultry)} \approx 10^{-1}$ year

poultry population, $N_{chicken}^{(poultry)} \approx \frac{f \times 10^{11}\ kg}{year} \times \frac{1\ chicken}{f\ kg} \times 10^{-1}\ year$

$\approx$ 1×10^{10} poultry chicken

(C)

total chicken population, $N_{chicken} \approx N_{chicken} + N_{chicken} \approx f \times 10^{10}$

data source: Food and Agricultural Organization (FAO) of the UN