15. If we compare the stable age distribution from a relatively stable, developed country (eg., Sweden) and a rapidly growing, developing country (eg., Honduras), we expect to see that the growing country's age distribution is ________ than the stable country's.

A. more elliptical (with a wide middle)
B. less elliptical
C. **more triangular (with a wide base)**
D. less triangular

16. In a population of small mammals both sexes have a survival probability of 1/3, and females produce on average 3 offspring per year who survive to be counted. (both of these values are independent of population density). Which of the following is true?

A. $f = 3$
B. $p = 2/3$
C. the average lifespan is 3 years
D. **the finite rate of growth λ depends on the sex ratio**
E. the finite rate of growth λ is 3.33

17. A species of plant produces 10 seeds on average in the first year after it is born, and 40 seeds on average in the second year after it is born, assuming it survives. Seeds survive the first year (and become adults) with probability 0.05, and first-year adults survive to become second-year adults with probability 0.8. Second-year adults always die.

a) (2 points). If we model this population by counting *after* reproduction, how many age classes do we have? How would you describe the individuals censused in each age class, and how would you number the age classes?

The age classes we consider are: the new seeds, the one-year-old post-reproductive adults, and the two-year-old post-reproductive adults. Since the two-year-olds are done reproducing (or even surviving), we typically choose not to count them. So we have two age classes: new seeds (age-class 1) and not-yet-finished adults (class 2).

One point for the idea that we start with newborns, one point for the idea that the first age class is always number 1.

b) (1 points). How would this differ if we counted *before* reproduction?

Before reproduction, we have two classes of adults about to reproduce. We also number them 1 and 2.

Need to be clear that we're not *counting seeds, but starting with first-year adults*

c) (2 points). If a scientist constructs life tables for the two scenarios above, what factors would you expect to be the same, and which ones could differ?

ℓ_1 is always 1! f_1 represents the product of the same two quantities (seed survival and first-year production) and should be the same in both life tables. The other fs and ps generally differ (although in this case we would also expect the two ps referring to adult survival to be the same; these are p_2 in the after case and p_1 in the before case. The "contributions" ℓf and their total $\mathcal{R}$ will always be the same no matter where in the life cycle you start a life table.

One point for the idea that ps and fs can differ. One point for the idea that contributions and $\mathcal{R}$ should be the same.

d) (4 points). Construct a life table for the case where we count *after* reproduction (not the most common way). Show how you calculate the values of f_x, and then complete the life table below.

We start with seeds, f_1 is the probability of a seed surviving, multiplied by the expected number of seeds it will produce: 0.05*10=0.5, and f_2 is the probability of the one-year-old adult surviving multiplied by an expected number of seeds: 0.8*40=32.

The first survival probability is from seed to adult, so p_1 in this case is equal to 0.05. The second survival probability is from adult until *after the last time the plant reproduces*. Conventionally, we write $p_2 = 0$ in this case, but you could also say 0.8, as long as you then write a third row showing $f_3 = 0$.

Life table

x	f_x	p_x	ℓ_x	$\ell_x f_x$
1	0.5	0.05	1.000	0.5
2	32	0	0.05	1.6
R				2.1

Roughly one point per column (p, f, l, contribution)