

1. A conservation biologist is interested in the factors that affect seed set ( $N_{seed}$ ) by an endangered plant. In addition to  $N_{seed}$ , the following variables were measured for individual plants.

Variable	Direction of effect	Reason
Soil nitrate (ppm)	_____	_____
Crowding (distance in cm to nearest plant)	_____	_____
Leaf area ( $cm^2$ )	_____	_____
Insect damage to seeds (scored from 0 to 3)	_____	_____

1a State the direction of effect (plus, minus, or zero) on  $N_{seed}$  for each of these 4 variables. Give a brief reason for each (if you use the other side of this sheet of paper to write out reasons, be sure to label each reason clearly).

1b. State three relations that you think might be important, within the set of 4 explanatory variables.

1c Draw a box and arrow diagram that shows these three relations, in addition to the relation of  $N_{seed}$  to each of these 4 variables. Draw the arrows in the direction of effect. Place a plus or minus sign over each of your 7 arrows, to show whether the relation is positive or negative.

2. Ainley *et al.* (1995, *Marine Ecology Progress Series* 118:69-79) used a 21 year time series from the Farallon Islands to investigate productivity (number of chicks fledged per year) for 6 seabird species in relation to proximate and remote factors leading to variation in food supply to chicks. They obtained measurements of 3 measurements of upwelling intensity and 1 biological factor. How many pairwise correlations are there in the set of 4 environmental factors ?

For  $n$  objects the formula for number of pairs will be

$$Pairs = \frac{n(n - 1)}{2}$$