1) Chromosome 3 of corn carries three loci (*D, E, and F*). A testcross of triple recessives with F1 plants heterozygous for the three genes yields progeny having the following genotypes (total=10,000):

730 D e f

722 d E F

770 d E f

782 D e F

21 D E f

27 d e F

3470 D E F

3478 d e f

1. Which gene is in the middle (2 points)?

F

1. What are the map distances between the genes (4 points)? Please draw a map of these genes and indicate the genetic distances in map units (1 point).

RFD-F=(730+722+21+27)/10000=0.15 (or 15 m.u.)

RFF-E=(770+782+21+27)/10000=0.16 (or 16 m.u.)

D 15 m.u. F 16 m.u. E

----+------------------+-------------------+-------

1. What is the interference value (2 points)? Is it positive, negative, or no interference (1 point)?

I = 1-(21+27)/(10000\*0.15\*0.16)=1-48/240=0.8

Positive interference.

2) A *Neurospora* cross (*w +* x *+ arg*) was made. One hundred linear octads (shown as tetrads) were scored, and they fell into the five classes given in the table below.

**1 2 3 4 5**

w + w arg w + w + w arg

w + + + w arg + + + +

+ arg + + + arg + arg + arg

+ arg w arg + + w arg w +

69 1 10 18 2

1. Deduce the linkage arrangement of the *w* locus and the *arg* locus. Include the centromere or centromeres on your map. Label all intervals in map units (7 points).

The distance between w and centromere: ½\*(1+18+2)/100=0.105 or 10.5 m.u.

The distance between arg and centromere: ½\*(1+10+2)/100=0.065 or 6.5 m.u.

The distance between w and arg: (1/2\*(10+18+2)+1)/100=0.16 or 16 m.u.

w 10.5m.u. c 6.5m.u. arg

+--------------------o------------------+

1. Diagram the meiotic divisions (label the crossover(s)) that led to class 5 (3 points).

