1) Chromosome 2 of corn carries three loci (*A, B, and C*). A testcross of triple recessives with F1 plants heterozygous for the three genes yields progeny having the following genotypes (total=10,000):

4309 A b c

4411 a B C

225 a B c

255 A b C

351 A B c

429 a b C

15 A B C

5 a b c

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

A

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).

RFB-A=(429+351+15+5)/10000=0.08 (or 8 m.u.)

RFA-C=(225+255+15+5)/10000=0.05 (or 5 m.u.)

B 8 m.u. A 5 m.u. C

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

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

I = 1-(15+5)/(10000\*0.08\*0.05)=1-20/40=0.5

Positive interference.

2) A *Neurospora* cross (*w arg* x *+ +*) 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 arg w + w arg w arg w +

w arg + arg w + + arg + arg

+ + + arg + + + + + +

+ + w + + arg w + w arg

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).

