1) Chromosome 4 of corn carries three loci (*R, H, and T*). A testcross of triple recessives with F1 plants heterozygous for the three genes yields progeny having the following genotypes (total=10,000):

150 R h t

138 r H T

3240 r H t

3248 R h T

751 R H t

761 r h T

831 R H T

881 r h t

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

T

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).

RFR-T=(761+751+150+138)/10000=0.18 (or 18 m.u.)

RFT-H=(831+881+150+138)/10000=0.2 (or 20 m.u.)

R 18 m.u. T 20 m.u. H

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

I = 1-(150+138)/(10000\*0.18\*0.2)=1-288/360=0.2

Positive interference.

2) A *Neurospora* cross (*t m* 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**

t m t + t m t m t +

t m + m t + + m + m

+ + + m + + + + + +

+ + t + + m t + t m

69 1 10 18 2

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

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

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

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

t 10.5m.u. c 6.5m.u. m

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

