Linkage Disequilibrium

1.) For a 1,000 chromosomes the following haplotypes were observed.

A_1B_1 _____200_____
A_1B_2 _____50_____
A_2B_1_____350_____
A_2B_2_____400_____

a) What is the allele frequency for the A_1 allele and A_2 allele _____.
b.) What is the allele frequency for the B_1 and B_2 allele_____.
c.) What are the expected haplotype frequencies under linkage equilibrium

$P_{11} = A_1B_1$ _____
$P_{12} = A_1B_2$ _____
$P_{21} = A_2B_1$_____
$P_{22} = A_2B_2$_____

2.) Please answer the following for the above problem.

D = _____
D'= _____
r^2 = _____

Is there statistical evidence that Marker A and B are in linkage disequilibrium_____?
X^2= _____ p-value=_____

Answers

1.) For a 1,000 chromosome the following haplotypes were observed.

A_1B_1 _____200____(0.2)____
A_1B_2 _____50____(0.05)___
A_2B_1_____350____(0.35)____
A_2B_2_____400____(0.4)____

a) What is the allele frequency for the A_1 allele and A_2 allele __A_1=0.25_____ __A_2=0.75___.
b.) What is the allele frequency for the B_1 and B_2 allele ___B_1=0.55____ __B_2=0.45____.
c.) What are the expected haplotype frequencies under linkage equilibrium?

$P_{11} = A_1B_1$ ___0.1375_____
$P_{12} = A_1B_2$ ___0.1125_____
$P_{21} = A_2B_1$____0.4125_____
$P_{22} = A_2B_2$____0.3375_____

2.) Please answer the following for the above problem.
D = ____(0.4*0.2)-(0.05*0.35)=0.08-0.0175=0.0625_____
D'= __0.0625/0.1125=0.556_____
r^2 = ____0.084_____

Is there statistical evidence that Marker A and B are in linkage disequilibrium ____yes_____?
X^2= _____84.2_____ p-value<0.00001_____