Quiz 4 Key (ave 87, s.d. 17, high 100(4), low 40)
BI-102-1, Fall '06, Dr. C. S. Tritt

Please keep your answers concise (more words will not necessarily lead to more points). Use the amount of space provided as a guide as to how detailed to make your answers. This is a 4 question, 2-sided test! The first 2 are worth 20 points each, that last 2 are worth 30 points each.

1. Briefly explain the significance of the G_0 stage of the cell cycle.

G_0 is a waiting (called "resting" in the slide show) stage between the G_1 and S stages. Not mentioning G_1 or S or not indicating that some cells wait (and do their "jobs") in G_0 (rather than continuing with replication) was -2 points. Answering as if G_0 is a check point was -5. Saying or directly implying that the cell is "getting ready" to replicate was -4.

2. Does crossing-over occur during mitosis or meiosis?

The correct answer is meiosis. Saying both was -15.

3. A man with type A blood and a women with type B blood have children with the following blood types: AB, B and O. Tell me as much as you can about the genotypes of these parents.

The fact that a child with type O blood is produced indicates that both parents must have at least 1 i allele. In this case it means they must be heterozygous (I^Ai and I^Bi).
Full credit was given for simply giving the Punnett square:

	I^A	i
I^B	I^AI^B (AB)	iI^B (B)
i	I^Ai (A)	ii (O)

Using any set of reasonable symbols. Using symbols a and b to represent I was -3 (A and B and I and O were okay). Answering this problem as if blood type is sex linked was -20.

4. In my spare time, I've been breading and studying MSOE camels. In particular I've determined their eye colors are determined by just 2 genes. One of these genes controls the brownness of animals' eyes. This gene has 2 alleles. I call them B (the dominant form that results in brown eyes) and b (the recessive form that results in blue eyes). The other gene controls the greenness of their eyes. This gene also has 2 alleles. I call them G (the dominant form that results in green eyes) and g (the recessive form that results in blue eyes). These genes assort independently (they're not linked). Also, B is epistatic with respect to G and g meaning that B with either of these results in a brown eyed animal. Similarly, G is epistatic with b in that G with b results in green eyed animals.

   Now for the problem, predict the ratio of eye colors in the F_2 offspring when true breeding brown eyed animals that are homozygous recessive (g) for the greenness gene are crossed with true breeding green eyed animals and the resulting F_1 animals are self-crossed.

The parental generation consists of BBgg and bbGG animals so the F1 animals are all BbgG (double heterozygous) and would all have brown eyes. When these animals are self-crossed, the following gametes are possible BG, Bg, bG, bg. The Punnett square for this cross is:

	BG	Bg	bG	bg
BG	BBGG (Brown)	BBGg (Brown)	BbGG (Brown)	BbGg (Brown)
Bg	BBgG (Brown)	BBgg (Brown)	BbgG (Brown)	Bbgg (Brown)
bG	bBGG (Brown)	bBGg (Brown)	bbGG (Green)	bbGg (Green)
bg	bBgG (Brown)	bBgg (Brown)	bbgG (Green)	bbgg (Blue)

So the F_2 ratio is 12 (brown): 3 (green) to 1 (blue). Misreading the square (writing in the wrong genotype) was -6. Completely messing up the square (as in putting only B's on one edge and G's on the other) was -25 (even if you got the correct answer). Getting just one letter wrong -12.