

**For these questions below you will LOSE CREDIT if you write too much, cram your words together or leave out the most important information. Be informative, but concise! Use only the space provided.**

1. c-ras is a proto-oncogene that normally is activated by binding to GTP, which is then slowly hydrolyzed to GDP, inactivating it. When bound to GTP it acts as a kinase, activating a cascade of other cellular proteins that are necessary for cell growth.

a) What is a proto-oncogene?

b) Mutant forms of ras can cause cancer. What is this kind of mutant called?

c) Would you expect these mutant forms to be dominant or recessive in those tumor cells?

2. Look up BCL2.

a) How did the gene get its name?

b) In only the space provided below, and in normal sized handwriting, say what kind of a gene it is using terms from class, and why it is researched heavily. Be concise!

3. Look up Myc

a) What is cMyc? Once again use terms and concepts from class, write only in the space provided!

b) what is vMyc, how is it different from cMyc in what it does?

3. List three different and important things that P53 does in our cells.

a)

b)

c)

4. For each of the following, name the model genetic organism that would be the best to use, and explain briefly why it would be the best to use.

a) Use an artificial DNA construct with a selectable nutritional marker inserted between the 5' and 3' flanking sequences of a nuclear gene encoding the mitochondrial RNA polymerase to create cells that lack the ability to make mitochondrial RNA.

b) Buy embryonic cells that you can insert human genes into, grow those cells into adult organisms that can be used to help develop treatments for human genetic diseases.

c) Create mutants by using transposable elements, look for changes cell fate during development by viewing changes in internal structure under a microscope. Allow the mutants to self-fertilize to see if changes are dominant or recessive.

5. A maternal effect mutation bicoid ( $bcd^-$ ) is recessive. The  $bcd^-$  allele makes no bicoid protein. In the absence of the bicoid protein product embryogenesis is not completed. Consider a cross between a female who is heterozygous ( $bcd^+/bcd^-$ ) and a homozygous mutant male ( $bcd^-/bcd^-$ ).

a) How is it possible for a male homozygous for the mutation to exist?

b) Predict the outcome (normal and/or failed embryogenesis) in the  $f_1$  and  $f_2$  generations resulting from this cross.