

## About the final exam

Once again, the best way to review for the exam is to redo the homework and the quizzes *without looking into the book or at the solution*. The exam will be open book but looking in the book for anything else that being sure that you have the right formula may be very long (and there will be many questions). Moreover, some exercises may combine several concepts so not to get confused, you'll have to *understand* what's happening. Being able to do a homework exercise by looking at all the examples is not what I call understanding.

To know if you really understand a concept, do as if you explained it to somebody who has never heard of it (for instance... what is the half-life of a radioactive element?). Don't just say *OK, sure, I understand*. Make the effort to say with words what this concept is. If you don't manage to say what is the half life it means that you don't really understand it (the half life *is not* half of some *total life*...). Among those concepts, think of

- the rate of change, the rate of growth, what's the difference between them?
- what is the number of dimensions of a geometrical object?
- what is the perimeter of a figure?
- what is the logarithm of a number, what is the square root of a number, what is its 36th root?
- what is the order of magnitude of a number
- what is exponential growth, what is linear growth, what is the difference between them?
- what happens to the volume of an object when you multiply its size by 2? what about the area?

Once again, it is not by reading the definition a concept in the book during the exam that you can get an understanding of it.

There is a reminder of what we have covered in chapters 3,4,5,6 in the review sheet of the midterm. If you lost it:<http://www.math.utah.edu/~vincent>.

I also did put the solutions of the quizzes and of the midterm so that you can practise. Also do the exercises on the list of additional problems done in class. Here is a summary of chapters 6,7 and 10a.

**Modeling our world.** You should know how to recognize the independent variable from the dependent variable and how to plot the graph of a function, and make predictions from a graph. Additionally to the homework, see exercises 3,7,9,13.

About linear graphs and modeling, you should know how to compute the rate of change, and how to compute the change in the dependent variable knowing the rate of change and the change in the independent variable, you should know how to solve and create linear equations and study models with 2 linear equations.

Chapter 6C entitled using formulas as models mainly shows how to solve non-linear equations. Taking powers, roots, logs, all kinds of equation you need to know how to solve. See also the log sheet of exercises.

**Exponential growth and decay.** There are two ways to look at this chapter. On the one hand, there are an awful lot of formulas, they all look the same, it may not be easy to know which to use. The other way to look at this is to realize that there are really 2(+2) important formulas in this chapter. All other formulas don't need to be known: you just have to solve the right equation. Moreover, using this point of view, you can easily solve problems given in a slightly different than the one in the book, and you will much less easily get confused. These 2 formulas are  $Q = Q_0(1 + r)^t$  and  $Q = Q_0 \times 2^{t/T_{double}}$  for exponential growth, the corresponding formulas for exponential decay are  $Q = Q_0(1 - r)^t$   $Q = Q_0 \times (\frac{1}{2})^{t/T_{half}}$ . But you really have to be familiar with them: what is  $t, T_{half}, Q, Q_0...$  Then when you have a problem, you usually just have to plug the values you know in the formula (maybe you'll need to take some dummy values) and solve for the quantity you're looking for. A good example of this is for radioactive dating, where you usually know the percentage of radioactive element remaining (take a dummy amount for the initial amount, the today amount being computed with the percentage), and you also know the half life so you just have to solve for time.

**Fundamentals of geometry** Here the most important matter is how surface area and volume change when you change the size of an object: if you multiply the size of an object by  $n$ , then its area will increase by  $n^2$

and its volume and consequently its mass will increase by  $n^3$ . If you copy a letter-size photo with 50% reduction in a photocopier, you can put 4 small copies on one letter sheet of paper. This should remind you about units with power: when you convert from square feet to square yard, the conversion factor is  $(3\frac{ft}{yd})^2 = 9\frac{ft^2}{yd^2}$ . That's the same kind of story.

**About your grade.** I will give you a reminder of your grades with your projects. The red figure is your average (out of 10 possible points). The next five ones are your five quizzes (over 10). The next one is the first project (over 30), the next one is the midterm (over 100) and the last one is the second project (over 100).

First, here is how to compute your pre-final grade:

- Take the sum of your 3 best quizzes. Divide the result by 3 and multiply it by .35
- Add your two projects grades. Divide the result by 6 and multiply it by .3.
- Divide your midterm grade by 10 and multiply the result by .15.
- Add the three numbers you got above and divide the result by .8.

You should get the red number: your pre-final average (out of 10 possible points).

Now, when you know your final-exam grade, do the following:

- Take your pre-final average and multiply it by .8
- Take your final-exam grade (over 100), divide it by 10 and multiply it by .2.

Add the two results to get your final score over 10. Multiply it by 10 to get it as a percentage.

I still don't know what are the letter grades but it will probably be close to the usual one: 90-100=A, 80-90=B, 70-80=C, 60-70=D.

*Good work !*