Digest 6

(A compilation of emailed homework questions, answered around Wednesday.)

Question. (From a student): For problems 1 and 2 What would ρ be? Since it's water and in the book they give the density of water ρ to be 10^3, do we use that?

Answer. Yes, assuming you are using standard units, which you should be using.

Question. (From a student): On homework problems 3-6 you give x to be a certain value. (Ex: #3 you say $x = 1$). Is this x considered to be a? The way the book notes the examples, it seems that an a value should be given to us so am I correct to assume that on the homework, the x values stand for the a values?

Answer. I have adjusted the wording on the homework since this question was asked, but in the future, if you are asked to compute a Taylor polynomial at some point x, then yes, you should interpret that particular point as $x = a$, for the purpose of creating the Taylor polynomial.

Question. (From a student): If $x = a$ for Taylor Polynomial calculations in questions 3 and 4, would it not follow that for any nth order Taylor polynomial, the value of the function $f(x)$ is simply $f(a)$? For example, in any second order polynomial, if $x = a$, we get $f(a) + f(a)(x - a) + 1/2f(a)(x - a)^2$. Thus, if $x = a$, wouldn't $(x - a) = 0$, and wouldn't $f(x) = f(a)$? Wouldn't this be true for every other nth order Taylor polynomial?

Answer. When we ask for a Taylor polynomial of a function, we need to specify some point. At this particular point, we take derivatives of the function f, and then plug them into a formula. When we specify a point for the Taylor polynomial, it should be understood that this is the point where we take the derivatives of the function f. For example, if I ask for the second order Taylor polynomial at $x = a = 0$, then I am asking for the Taylor polynomial of the form $T_2(x) = f(0) + f'(0)(x - 0) + (1/2)f''(0)(x - 0)^2$. Note that $T_2(x)$ is a function of the variable x.

Question. (From a student): Are we expected to know how to convert the equations to summation notation for the midterm?

Answer. Yes, you should know how to use summation notation. I assumed this was in a previous course. If not, just note that

$$\sum_{j=1}^{n} a_j = a_1 + a_2 + a_3 + \cdots + a_{n-1} + a_n.$$

For example,

$$\sum_{j=1}^{n} j = 1 + 2 + 3 + 4 + \cdots + (n-1) + n.$$

$$\sum_{j=1}^{n} j^2 = 1 + 4 + 9 + 16 + \cdots + (n-1)^2 + n^2.$$

Question. (From a student): You specified pages 19-30 of your lecture notes to focus on. These pages include trigonometric substitution, and though I realize we need to know the entire quarter's worth of information to be properly prepared for this exam, trig substitution was tested on the last midterm, so I was wondering if it will still be emphasized on this exam or if I should focus on partial fractions and beyond.

Answer. The announcement says the exam focuses on everything *after* page 19. So, trigonometric substitution will not be the focus of the exam. Only things after that.

Question. (From a student): I've been reviewing the method of partial fractions and it doesn't seem to be in your lecture notes, but it is in the book. Should I be learning about irreducible quadratic polynomials and how to use trigonometric substitution to integrate them?

Answer. You do need to know partial fractions. You don't need to know how to handle irreducible quadratic terms for the method of partial fractions (though, if you are curious how to handle these terms, see the solution of Exercise 4 on Homework 4). You do need to know how to use trigonometric substitution, since we have covered that before, but this topic will not be the focus of the exam.

Question. (From a student): As you mentioned in a previous email you said we are not expected to memorize the formula for fluid pressure/force. Does this mean we will still have a word problem on the midterm that gives us this formula and we need to know how to use it?

Answer. This is possible, yes.