Assignments (due on the given date) for Math 225, Spring 2014

(1/21)

1. You might find it helpful to read the syllabus (available online) before our first class meeting.
2. At the website http://people.whitman.edu/∼ gordon/, you should follow the link 'Written Exam in Mathematics' and look at the summaries of Calculus I and Calculus II that are given there since these two courses are prerequisites for Calculus III. In addition, returning to the main webpage and following the link 'Advice for Students' may provide you with some helpful information.

(1/23)

0. For the record, this assignment may be longer than the typical assignment. It depends on how much review you need to do and your ability to follow the writing guidelines for the course.
1. Reread the syllabus.
2. Spend some time reviewing Calculus I and Calculus II; there are various ways to do so.
3. Turn in solutions for the problems on the introductory assignment. You should model your solutions based on the sample homework solutions given on the syllabus. It might be a good idea to solve the problems on another piece of paper then write polished solutions on the assignment sheet.
4. Read the first two pages of Section 10.1 and do problems 1, 5, 8, 11, and 13 in Section 10.1.

(1/24)

1. Read Section 10.1 and the portion of Section 10.2 involving tangents.
2. Do problems 19, 21, 24, 28, 31, 33, 35 (at least think about the equations you would use), and 41 in Section 10.1, and problems 3, 4, 6, 11, 13, and 17 in Section 10.2.

(1/27)

1. Read the portion of Section 10.2 involving areas and arc length.
2. Do problems 25, 31, 34, 39, 43, 54, and 56b in Section 10.2.
3. For problem 25, you should be able to eliminate the parameter to see what the equation of the curve would look like in Cartesian form. For problem 34, you can practice some of the ideas we discussed in class concerning trig integrals (you do need to learn the half-angle identities). It is not essential that you have a calculator that can do integrals; if you do not, then at least simplify the integral that is needed for problem 39. You can use a table of integrals for the integral in problem 43, but practicing trig substitution is not a bad idea. Problems 54 and 56 are quite easy if you simplify the integrands (remember the other part of the FTC for problem 56 as well).
4. Turn in solutions for problem 42 in Section 10.1 and problems 30 and 36a in Section 10.2. You just need some basic trigonometry (and a familiar property of tangent lines to circles) for problem 10.1.42. For problem 10.2.30, note that the given point is NOT on the curve; this means that you need to approach the problem a little differently than usual.

(1/28)
1. Read Section 12.1.
2. Do problems 3, 7, 11, 13, 23–34, 38, and 43 in Section 12.1.
3. Turn in solutions for problems 16, 20, and 42 in Section 12.1.

(1/30)
1. Read Section 12.2.
2. Do problems 5, 7, 9, 13, 15, 19, 21, 25, 29, 33, 40, and 41 in Section 12.2.

(1/31)
1. Read Section 12.3.
2. Do problems 3, 5, 9, 15, 19, 21, 23, 31, 39, 45, 49, and 51 in Section 12.3. Most of these should go very quickly.
3. Turn in solutions for problems 30, 44, 56, and 64 in Section 12.3.

(2/3)
1. Read Section 12.4.
2. Do problems 3, 5, 9, 13, 15, 17, 19, 27, 35, 47, and 49 in Section 12.4.
3. Turn in solutions for problems 10, 32, 38, and 44 in Section 12.4.

(2/4)
1. Read Section 12.5 through Example 7.
2. Do problems 1, 3, 5, 9, 11, 15, 19, 21, 25, 37, 53, and 57 in Section 12.5.
3. Turn in solutions for problems 10, 32, and 62 in Section 12.5.

(2/6)
1. Look over Section 12.5 again.
2. Do problems 12, 13, 14, 35, 45, 71, 73, and 79 in Section 12.5.
3. We will spend some time going over these problems in class and some time reviewing for the exam.

(2/7)
1. We have a test on Sections 10.1–10.2 and 12.1–12.5.
2. To prepare for the exam, you should be certain that you have done (or convinced yourself that you could do) all of the problems assigned thus far, not just the ones you have turned in.
3. For extra problems in Chapter 10, you can do review problems 1, 2, 3, 4, 6, 21, 22, 25, 26, and 28. (These problems are found at the end of Chapter 10 in the text.)
4. For extra problems in Chapter 12, you can do items 1–17 in the concept check, the true-false quiz (do pay attention to these), and review problems 1–27 omitting problems 7, 8, 9, 13, and 14. (This material can be found at the end of Chapter 12 in the text.)

(2/10)
1. Browse Section 12.6, mainly looking at the pictures.
2. You do not need to memorize names or shapes but you should acquire a rough idea of what the graphs of these equations involving three variables look like in 3D.
3. Do problems 21–28 in Section 12.6.

(2/11)
1. Read Section 14.1. This is a long section but the ideas are not too difficult.
2. Look at the color pictures in the book so that you can get a sense of what graphs look like in 3D. If you are curious, you can go to Wolfram alpha (at https://www.wolframalpha.com/) and try having it do some graphs for you. For instance, you can type the command "plot z=xˆ2+yˆ2" to view a portion of the surface generated by this equation.
3. Do problems 3, 5, 11, 13, 15, 21, 32, 33, and 36 in Section 14.1.

(2/13)
1. Read Section 14.2.
2. Do problems 1, 5, 7, 9, 11, 13, 21, 31, and 33 in Section 14.2.
3. Turn in solutions for problems 14, 16, and 18 in Section 14.2.
4. Turn in solutions for the two problems on the First Exam Boost.

(2/14)
1. Read Section 14.3.
2. Do problems 1, 15, 19, 25, 27, 31, 43, 53, and 77 in Section 14.3.
3. Turn in solutions for problems 10, 22, 42, and 75 in Section 14.3.

(2/17)
1. No class: President's Day.

(2/18)
1. Read Section 14.4.
2. Do problems 1, 3, 6, 7, 11, 12, 13, 17, 19, 21, 26, 31, 32, and 46 in Section 14.4. For problem 7, try typing "plot z=xˆ2+xy+3yˆ2 with tangent plane at (1,1,5)" into WolframAlpha and see what you think of the picture that is generated.
3. Turn in solutions for problems 6, 12, 21, 26, and 32 in Section 14.4.

(2/20)
1. No class: Power and Privilege Symposium.

(2/21)
1. Read Section 14.5 carefully and do not let the notation overwhelm you.
2. Do problems 1, 5, 7, 9, 13, 17, 19, 21, 33, 35, 41, 43, 48, and 55 in Section 14.5. Some of these problems will require some patience.
3. Turn in solutions for problems 14, 24, 38, and 46 in Section 14.5. The details for problem 46 are a bit messy but the equations come out nicely at the end.

(2/24)
1. Read Section 14.6.
2. Do problems 5, 9, 13, 17, 18, 19, 21, 24, 25, and 35 in Section 14.6.
3. Turn in solutions for problems 12, 20, and 34 in Section 14.6.
4. We will have a short quiz on the basic ideas we have covered thus far in Chapter 14.

(2/25)
1. Review Section 14.6.
2. Do problems 40, 41, 43, 56, and 63 in Section 14.6.
3. Turn in solutions for problems 44 and 60 in Section 14.6.

(2/27)
1. Read the first two-thirds of Section 14.7.
2. Do problems 3, 5, 6, 7, 11, 19, 37, and 41 in Section 14.7.
3. Turn in a solution for the following problem: Find the point on the surface $z = x^2 + y^2$ that is closest to the point $(14, 21, 10)$.

(2/28)
1. Read the rest of Section 14.7.
2. Do problems 29, 32, 33, 47, 52, 54, and 56 in Section 14.7. Do some thinking on these problems before blasting into partial derivatives, etc.
3. Turn in a solution for part (c) of problem 52 in Section 14.7. (Note that you do not need to do part (b) to solve part (c).)

(3/3)
1. Read Section 14.8.
2. Do problems 5, 9, 15, 16, 18, and 25 in Section 14.8. For problems 15, 16, and 18 DO NOT use the two constraint idea at the end of the section. Reformulate the problems so that there is at most one constraint, that is, do some thinking. Problem 25 is one of the more common ways Lagrange multipliers appear in theoretical applications so give it some careful thought. By the way, can you solve problems such as 8, 11,, and 12 with simple reasoning and no calculus?
3. Turn in a solution for problem 25 in Section 14.8.

(3/4)
1. Review Chapter 14, including reading the Concept Check on page 967.
2. Do the true-false quiz that begins on page 967 and begin working on problems 1, 6, 9, 10, 19, 24, 25, 29, 33 (without a calculator), 37, 43, 44, 46, 47, 51, 53, 55, 62 (think outside the box), 63, and 64 in the Chapter 14 review.
3. I will begin talking about integration theory for functions of more than one variable.

(3/6)
1. We will review for the exam on Chapter 14 so bring in your questions.

(3/7)
1. We have a test on Chapter 14.
2. To prepare for the exam, you should be certain that you have done (or convinced yourself that you could do) all of the problems assigned thus far, not just the ones you have turned in.

(3/10)
1. Read Section 15.1.
2. Do problems 1, 4, 7, 9, 11, 12, and 18 in Section 15.1. For problem 9, use $m = 4 = n$ instead of $m = 2 = n$.
3. Turn in solutions for problems 4, 12, and 18 in Section 15.1.

(3/11)
1. Read Section 15.2.
2. Do problems 3, 4, 7, 9, 11, 21, 25, and 35 in Section 15.2. For problem 11, consider changing the order of integration.
3. Turn in solutions for problems 16, 20, and 26 in Section 15.2.

(3/13)
1. Read Section 15.3.
2. Do problems 1, 4, 5, 15, 17, 18, 29, and 51 in Section 15.3.
3. Turn in solutions for problems 14, 22, 26, and 46 in Section 15.3.

(3/14)
1. Read the first part of Section 15.5 concerning mass and center of mass.
2. Do problems 32, 43, and 59 in Section 15.3 and problems 1, 5, 6, and 15 in Section 15.5.
3. Turn in solutions for problems 52 and 62 in Section 15.3 and problem 10 in Section 15.5.

(3/31)
1. Read Section 8.5 and the portion of Section 15.5 that discusses probability.
2. Do problems 3, 6, and 11 in Section 8.5 and problems 27, 28, and 29 in Section 15.5.
3. Turn in solutions for problems 4 and 8 in Section 8.5 and problem 30 in Section 15.5.

(4/1)
1. Read Section 10.3; hopefully some of this is review.
2. Do problems 3, 5, 7, 11, 15, 17, 19, 25, 31, 32, 35, 39, 43, 54, 55, 67, and 69 in Section 10.3.
3. Do spend some time looking at the graphs in the text as some of these are rather interesting. You can use Maple or Wolfram Alpha for the graphs in problems 67 and 69.
4. Turn in solutions for problems 20, 26, 46, and 56 in Section 10.3. For problem 46, there is no need to sketch the curve in Cartesian coordinates unless you find it helpful. Be certain that you can do simple sketches of graphs such as these without a calculator.

(4/3)
1. Read the portion of Section 10.4 concerning areas.
2. Do problems 52, 63, 65, 71, and 72 in Section 10.3 and problems 6, 7, 11, 17, 21, 23, and 25 in Section 10.4.
3. Turn in solutions for problem 74 in Section 10.3 and problems 22 and 24 in Section 10.4. Remember that an exact value as requested in problem 10.3.74 means to leave the square roots intact and not give decimal approximations. You should be able to do all these problems without the aid of a calculator or textbook, including being familiar with some basic trig identities.

(4/4)

1. Read Section 15.4 and the portion of Section 10.4 concerning arc length.
2. Do problems 29, 48, and 51 in Section 10.4 and problems 1, 5, 7, 11, 13, 21, 27, and 29 in Section 15.4.
3. Turn in solutions for problem 30 in Section 10.4 and problems 8 and 20 in Section 15.4.

(4/7)

1. Review any recent material that is giving you trouble.
2. Do problems 31, 38, and 41 in Section 15.4 and problems 11, 13, and 14 in Section 15.5.
3. Turn in solutions for problem 35 in Section 15.4, problem 12 in Section 15.5, and the following problem: consider the curve given in problem 72 in Section 10.3. A graph of this curve reveals that it has four skinny symmetric loops and four larger symmetric loops. Find the total area enclosed by the curve (give the exact value for this part), the area of one of the skinny loops, and the area of one of the larger loops. You may use technology for this problem, but carefully write down the integrals you are evaluating and mention the technology that you use. Give your answers for the last two areas correct to six decimal places.

(4/8)

1. No class today due to the undergraduate conference; do attend some talks by your peers.

(4/10)

1. Read Section 15.6.
2. Do problems 3, 4, 6, 7, 9, 10, and 13 in Section 15.6. I will not be collecting any of these.

(4/11)

1. We have a test on Sections 10.3–10.4 and 15.1–15.6.
2. As usual, you can begin your review by going over the sections we have covered and making sure that you understand the concepts and can do all of the problems that have been assigned. For extra problems in Chapter 15 review (remember to do these without a calculator), you can do 4, 5, 9, 10, 13, 14, 17, 18, 19, 20, 21, 22, 29, 30 (use technology on this integral since it is tedious), 32, 35ab, 36, 39 (but change the third vertex to $(1, 2)$), 41, and 45. Numerical answers for these problems are $e - 2$ (for 4), $(e - 1)/4$ (for 14), $(\pi - \ln 4)/4$ (for 18), $4/3$ (for 20), $\left(2\sqrt{2} - 1\right)/3$ (for 22), $53/20$ (for 30), 12π (for 32), $4/(3\pi)$ for both coordinates in part (a) and $(5\pi a/32, 5a/8)$ for part (b) (for 36), $\left(6\sqrt{6} - 2\sqrt{2}\right)/6$ (for modified 39). For extra problems in Chapter 10 review (still without a calculator), you can do 9, 11, 12, 24, 31, 35, and 40. The answer for problem 40 is $\left(4\pi - 3\sqrt{3}\right)/8$.

(4/14)

1. There is no assignment for today. We will be working on triple integrals this week.

(4/15)
1. Read Section 15.7. The ideas presented are simple extensions of the material on double integrals.
2. Do problems 3, 4, 9, 13, 14, 21, 41, and 51 (part (c) is messy unless you do NOT expand the $(1-x)$ terms) in Section 15.7.
3. Turn in solutions for problems 8, 18, 34 (just the integrals for the two forms $dy\,dx\,dz$ and $dz\,dx\,dy$), and 42 in Section 15.7.

(4/17)
1. Read Section 15.8.
2. Do problems 17, 21, 22, 23, and 27 in Section 15.8.
3. Turn in solutions for problems 18, 28, and 30 in Section 15.8.

(4/18)
1. Read Section 15.9.
2. Do problems 1, 3, 7, 11, 13, 15, 21, 23, 33a, 36 (with geometry and no calculus), and 39 in Section 15.9.
3. Turn in solutions for problems 24, 34 (use symmetry to find two of the coordinates without integration), and 40 (but change the lower limit of integration for z to 0) in Section 15.9.

(4/21)
1. Read Section 15.10.
2. Do problems 1, 3, 5, 7, 9, 17, 19, and 23 in Section 15.10.
3. Turn in solutions for problems 16, 26, and 27 in Section 15.10.
4. It might be a good idea to review Sections 15.7 through 15.10 to be certain you understand the underlying ideas. We will be starting our study of vector calculus this week.

(4/22)
1. Read Section 16.1, paying particular attention to the graphs of vector fields.
2. Do problems 3, 5, 9, 11–18 (just matching functions and graphs), 21, 23, 29–32 (more matching), and 33 in Section 16.1.
3. If you are interested, the commands

   ```
   with(plots):
   fieldplot([-y,x],x=-2..2,y=-2..2);
   ```

   in Maple will generate a vector field plot.

(4/24)
1. Read Section 16.2; it is a bit long but you should be able to skim parts of it.
2. Do problems 1, 3, 5, 7, 9, 15, 17, 19, 21, 33, and 39 in Section 16.2.
3. Turn in solutions for problems 10, 14, 34, and 41 in Section 16.2.

(4/25)
1. Read Section 16.3. Pay careful attention to the theorems and definitions.
2. Do problems 1, 3, 5, 7, 9, 11, 12, 13, 15, 17, 19, 23, 25, 26, 31, 32, 33, and 34 in Section 16.3. You should find that most of these problems take less than three minutes each.
3. I will not be collecting any of these. However, there will be a short quiz on basic material we have covered since the last exam.

(4/28)
1. Read Section 16.4, including trying to understand the basic ideas behind Green's Theorem.
2. Do problems 1, 3, 5, 11, 19, and 22 in Section 16.4.
3. Turn in solutions for problems 10, 12, and 28 in Section 16.4.

(4/29)
1. Review Sections 16.1 through 16.4 as needed.
2. Do problems 3, 7, 10, 11, 14, 16, and 17 in the review exercises for Chapter 16. I will not be collecting any of these solutions.

(5/1)
1. Read Section 16.5.
2. Do problems 1, 3, 9, 10, 11, 12, 13, 15, 17, 19, 21, and 23 in Section 16.5.
3. Turn in solutions for problems 8, 16, 25, and 33 (use 25) in Section 16.5.

(5/2)
1. Read (with some skimming) Section 16.6.
2. Do problems 3, 6, 13, 15, 19, 21 (try using a polar coordinate type parameterization), 23, 33, 39, 40, and 49 in Section 16.6.
3. Turn in solutions for problems 20, 34, and 46 in Section 16.6.

(5/5)
1. Read and/or skim the parts of Section 16.7 that we talked about in class.
2. Do problems 5, 7, 11, 19, 22 (answer is π), 23, and 31 (just the part of the boundary that is curved, answer is $8/3$) in Section 16.7.

(5/6)
1. We have a test on the material since the last exam.
2. The exam covers Sections 15.7 through 15.10 and Sections 16.1 through 16.7. The best way to prepare for the exam is to review these sections (thinking carefully about the ideas and making note of any formulas you should know) and to look over (and perhaps redo) the problems that have been assigned.
3. In order for you to plan ahead, there will be a take-home question for the exam. It will be handed out on Monday (our review day) and be a problem that involves a change of variables for double integrals (Section 15.10).

(5/8)
1. There is no specific assignment for this day.

(5/9)
1. Read Section 16.8.
2. Do problems 2, 3, 7, 8 (answer is $1/24$), 10 (answer is 9π), 13, 14 (answer is 8π), and 17 in Section 16.8.

(5/12)

1. Read Section 16.9.
2. Do problems 2, 5, 7, 8 (answer is $384\pi/5$), 11, 12 (answer is $2\pi/3$), 17, 19, and 24 (turn the integral into a flux integral, answer is $4\pi/3$) in Section 16.9.
3. There will most likely be some sort of take-home assignment in order to improve grades since the last exam did not go well for most people.

(5/13)

1. Our final exam is comprehensive so we will want to begin our review.
2. The final exam is scheduled for 2–5 pm on Monday, May 19 and will take place in our usual classroom. One place to start your review is to go to my website and follow the link for 'Written Exam in Mathematics', then focus on the three links that involve Calculus III. You should also flip through the sections of the textbook that we have covered looking for key ideas and any formulas you will need to remember (since the exam is closed book). Browse through the problems that were assigned in each section; you should find that you remember how to do many of these problems. The review exercises that were assigned in each of the chapters can be helpful since it is less clear which section of the chapter is relevant for solving the problem. Below is a list of problems from each section that you can look at more carefully. (I have not included the review exercises that were previously assigned but you should look those over carefully.)

10.1: 19, 21, 31, 33
10.2: 3, 11, 17, 30, 32
10.3: 31, 35, 39, 56, 74
10.4: 7, 17, 25, 32, 48
12.1: 13, 16
12.2: 21, 25, 41
12.3: 19, 23, 31, 44
12.4: 5, 19, 27, 32
12.5: 5, 9, 12, 19, 21, 33, 35, 45, 57, 71
14.1: 13, 21
14.2: 14, 18, 31
14.3: 22, 43, 53
14.4: 1, 7, 13, 21, 31
14.5: 14, 19, 21, 31, 35, 48
14.6: 9, 12, 19, 21, 24, 35, 43, 60, 63
14.7: 11, 29, 33, 41, 47
14.8: 5, 9, 15 (reduce to one constraint), 30
15.1: 11, 12
15.2: 9, 11, 26, 35
15.3: 3, 14, 15, 19, 26, 43, 51, 52, 59
15.4: 7, 8, 20, 21, 30, 31
15.5: 5, 10, 11, 12, 27
15.6: 7, 9
15.7: 3, 13, 21, 42
15.8: 18, 21, 27, 28, 30
15.9: 23, 24, 34, 39
15.10: 19, 23
15R: 23, 25, 26, 42, 47, 49
16.1: 21, 23
16.2: 1, 3, 10, 15, 20, 41
16.3: 3, 7, 9, 13, 15, 16, 19
16.4: 5, 9, 11, 17
16.5: 8, 13, 16, 17
16.6: 20, 26, 33, 37, 41, 49
16R: 27, 28, 30, 32, 33, 34, 37, 39