

Preparation sheet for the Final Test

Problems on this Test will be based on the homework problems listed below.

Note 0: I recommend that you **begin studying from the end of this Preparation sheet**, because problems from Chap. 16 will have a higher weight on the exam than other problems of a similar difficulty level.

Note 1: Remember that in all problems on multiple integration, you must begin with a sketch. An otherwise correct solution that is missing a sketch will incur a 5-point penalty. Moreover, for problems with triple integrals in Cartesian and cylindrical coordinates, you must present *both* the 3D sketch and a 2D sketch showing its projection on a relevant plane. A missing latter sketch will entail a 3-point penalty in addition to the penalty mentioned above.

Note 2: You should check the original homework assignment for Hints or Notes for any of the problems listed below with an asterisk (e.g., 2*). Some problems have more than one Hint or Note, so make sure to *find and use all of them*.

Note 3: If an even-numbered problem does not have an answer listed on the homework webpage, then it must be a WebAssign problem, and the answer should be found there.

Note 4: A problem on the Test may combine concepts of more than one problems listed on this sheet, or it may use only part of the solution of a given homework problem.

Note 5: Groups of problems from the same section that may pertain to different test problems are separated by a space.

Note 6: If you notice that some of the problems on this preparation sheet are similar to problems from midterms, you should consult the posted solutions for those midterms on how the corresponding problems were to be done.

When preparing for the Test, you need to **redo** the problems listed below and also review the related examples in the notes and in the book. To rephrase this: It will **not help you much** if you simply browse those problems **without actually doing them**.

On this Test, use of calculators will be allowed.

You may also prepare and use *two* double-sided sheets with formulae.

1. Sec. 12.2: ## 15, 16, 31, 33, 39, 45(a-b only)*.
2. Sec. 12.5: ## 29, 33, 63.
3. Sec. 13.1: ## 8*.
4. Sec. 13.2: ## 3(a)*.
5. Sec. 13.3: ## 20(a), 24(a)*. Do **not** calculate $\vec{N}$. Focus on sketching $\vec{T}$ and $\vec{N}$ instead.
6. Sec. 13.4: Review Fig. 7 in the textbook (and your Notes, of course) and do # 8(b)* in the Concept Check section at the end of Chap. 13. Then do ## 3*, 6*, 43* from Sec. 13.4 and both Word Problems*.

Note: Make sure you read the comments posted for these problems on the homework webpage

and do what they say. Also, however simple Fig. 7 in Sec. 13.4 may seem, make sure you understand **and can reproduce on your own** what it shows. On the test, you must make it *crystal-clear* how the tangential and normal components of acceleration are related to the acceleration vector and to one another. On the test, you will be asked to find the components of the acceleration vector *from a sketch* rather than from a formula.

7. Sec. 14.2: ## 13, 14, 15, 17*, 28*, 29*, 35 (do this problem by hand, **not** on a computer).
8. Sec. 14.4: ## 8*, 18*, 25, 26, 27. For # 26, you do **not** need to make a plot.
9. Sec. 14.6: ## 29, 33(b)*, and in Review Exercises on p. 1031: ## 44(a–c)*, 47, 48*.
10. Sec. 14.7: ## 38*, 39*, and also the Word Problem posted on the HW website.
Note: When working on these problems, make sure to do two things: (i) Find an example in the notes related to all of these problems and closely follow its guidelines; (ii) Think about one common feature of the boundary in all these problems. The Mathematica notebook posted next to the notes for Sec. 14.7 on the course webpage may help you to visualize what is going on in this type of problems.
11. Sec. 15.3: ## 16, 19*, 22*, 36. Review Ex. 1 in the Notes for this Section.
Note 1: The problem on the test will emphasize setting up an integral, not its evaluation. Therefore, use Mathematica to evaluate any integrals when working through the above three problems and comparing your answers to those in the book or WebAssign.
Note 2: When reviewing ## 16, 36, make sure that you sketch both the 3D solid and its projection in the xy -plane.
12. Sec. 15.4: ## 29, 30(a,b)*, 31(a,b) and also # 51 on p. 1120.
13. Sec. 15.7: ## 25, 26*. Review Ex. 1 in the Notes for Sec. 15.3.
 When working on these problems, make sure that you sketch both the 3D solid and its projection in the xy -plane.
14. Sec. 16.2: ## 1, 3, 10*, 36*, 38* (focus on the setup rather than evaluation; do the integrals by Mathematica to check your answers); # 7 and also review Example 5 in the Notes.
15. Sec. 16.3: ## 3, 4, 7, 27, 19, 20*, 11; 41.
16. Sec. 16.4: ## 1, 3, 5, 8, 15, 21; 31* and also # 38* on p. 1210.
17. Sec. 16.6: ## 40*, 48, 58(a)* (these problems are needed in connection with the next item on this list).
18. Sec. 16.7: Do the entire assignment for this section. Also, review Examples 1 and 2 **in the Notes**. In the problem on the test, you will be **required to use parametric equations** of a surface, **not its Cartesian equations**, even though it may be given to you in Cartesian coordinates.
19. Sec. 16.9: Do the entire assignment for this section. Make sure you can write down the Gauss/Divergence Theorem with the *correct notations*. Use vector notations wherever needed and distinguish between the dot product and the usual product. Most importantly, use the correct notation for the integral. Recall that the notation used in the book in the statements of both the Theorem and the problems (as well as a similar notation in WebAssign) is *incomplete*.