Preparation sheet for Test 3

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

Note 1:   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 2:   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 3: 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 4: Groups of problems from the same section that may pertain to different test problems are separated by a space.

When preparing for the Test, it will be beneficial for your performance if you **redo** the problems listed below, and also review the related examples in the notes and in the book. Please **note**: 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 one double-sided sheet with formulae.

1. Sec. 15.2: # 20*, 56*, 58*, 18*, 61, 63, 64*. (The WA problem most similar to # 64 is # 7 on the WA list.)

2. Sec. 15.3: ## 39, 41.   Do not evaluate the integrals; just convert to polar coordinates. See Selected answers below.

3. Sec. 15.6: ## 20*, 22, 27(a), 31, 35.   Do not evaluate the integrals; just set them up. See Selected answers below.

4. Sec. 15.7: ## 5, 6, 12, 18*, 23, 24, 25, 26*, 31*.   Do not evaluate the integrals; just set them up. See Selected answers below.

5. Sec. 15.8: ## 5, 12*, 13, 17*, 20, 21(a), 26, 27, 28, 29, 32, 43.   Do not evaluate the integrals; just set them up. See Selected answers below.

6. Sec. 15.9: 11, 7*, 25, 26;
    and also # 55 in Review Exercises at the end of Chap. 15 (p. 1120).

See Selected answers and Important note on next page

Selected answers

15.3.39: $\displaystyle\int_0^{\pi/2}\int_0^2 \exp[-r^2]\, r\, dr\, d\theta;$ # 15.3.41: $\displaystyle\int_0^{\pi/6}\int_0^1 r^3 \cos\theta\, \sin^2\theta\, r\, dr\, d\theta.$

15.6.20: $\displaystyle\int_0^1\int_0^{1-x}\int_{x+y}^1 xz\, dz\, dy\, dx;$ # 15.6.22: $\displaystyle\int_0^3\int_0^{y/3}\int_0^{\sqrt{9-y^2}} z\, dz\, dx\, dy.$

15.7.24: $\displaystyle\int_0^{2\pi}\int_0^1\int_{-\sqrt{4-r^2}}^{\sqrt{4-r^2}} r\, dz\, dr\, d\theta;$ # 15.7.31: $\displaystyle\int_0^{2\pi}\int_0^2\int_r^2 r^2 \cos\theta\, z\, dz\, dr\, d\theta.$

15.8.29: $\displaystyle\int_0^{2\pi}\int_{\pi/6}^{\pi/3}\int_0^a \rho^2 \sin\phi\, d\rho\, d\phi\, d\theta;$ # 15.8.26: $\displaystyle\int_0^\pi\int_0^\pi\int_0^3 \rho^4 \sin^3\phi\, \sin^2\theta\, d\rho\, d\phi\, d\theta;$

15.8.28: $\displaystyle\int_0^{2\pi}\int_0^{\pi/4}\int_1^2 \rho^3 \sin\phi\, d\rho\, d\phi\, d\theta;$ # 15.8.27: $\displaystyle\int_0^{\pi/2}\int_0^{\pi/2}\int_0^1 \rho^3 \sin\phi\cos\theta\, e^{\rho^2}\, d\rho\, d\phi\, d\theta;$

15.8.32: $\displaystyle\int_0^{2\pi}\int_{\pi/4}^{\pi/2}\int_0^2 \rho^2 \sin\phi\, d\rho\, d\phi\, d\theta;$ # 15.8.43: $\displaystyle\int_0^{\pi/2}\int_0^{\pi/4}\int_0^{\sqrt2} \rho^4 \sin^3\phi\, \sin\theta\cos\theta\, d\rho\, d\phi\, d\theta.$

<u>IMPORTANT NOTE</u>

When working on all of these problems, you must practice sketching the solids and the regions of integration. This is <u>especially critical for problems in Secs. 15.6, 7, 8</u>, where you will have to sketch a 3D object.   Remember: People are not born with a 3D intuition; so the only way to develop it is by much practice. It will be **critically important for your performance on this test** to be able to sketch a 3D solid in a short amount of time.

    To help you verify your sketches, please refer to the Mathematica notebook which is posted next to this preparation sheet.