Math 2E – Suggested Homework 1

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Thursday, January 9, 2020

Reading: Sections 15.2, 15.3, and 15.6. In section 15.3, ignore the derivation of the polar coordinates formula, and ignore Examples 3 and 4. In section 15.6, ignore the derivation of the triple integral, ignore Example 4 and ignore the applications about moments and center of mass. Please review the 6 surfaces in section 12.6 (in chapter 12), you'll see them over and over again. There will be more 15.6 problems on the next homework set.

(1) Homework in this class is **NOT** to be turned in, but I still encourage (and expect) you to do it, because the problems on the exams will be based on those suggested problems.

(2) Solutions to all the problems in chapter 15 and 16 on my website.

(3) AP refers to the additional problem on the next page.

- **Section 12.6:** (this is not a typo) $21 - 28$[1]
- **Section 15.2:** 9, 18, 25, 39, 52, 56, 62
- **Section 15.3:** 9, 13, 23, 25, 26, 37, AP
- **Section 15.6:** 9, 15, 18, 19, 20

[1] Answers: 21-VII, 22-IV, 23-II, 24-III, 25-VI, 26-I, 27-VIII, 28-V

Additional Problem:

(a) Just like I did in lecture, sing polar coordinates, calculate the following integral, where $a > 0$ is a fixed constant

$$\int_{-\infty}^{\infty} e^{-a\left(x^2\right)} dx$$

(b) (Optional) Use (a) with $a = -i$ and the following facts about complex numbers to calculate[2]

$$\int_{-\infty}^{\infty} \cos(x^2) dx \text{ and } \int_{-\infty}^{\infty} \sin(x^2) dx$$

Fact 1: $\frac{1}{\sqrt{-i}} = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} i$

Fact 2: $e^{iz} = \cos(z) + i \sin(z)$ for any z

Fact 3: If $a + bi = c + di$, then $a = c$ and $b = d$

Solution: Integral of $\sin(x^2)$

[2]Technically the result of (a) doesn't apply since a isn't necessarily positive, but surprisingly it gives the correct result!