

Test 3 Information (from Quercus)

Date: Date: Friday, Feb 7

Test Material: 14.5-14.8, 15.1-15.5

Topics Checklist: Section.14

How to use the checklist: First of all, understand every topic intuitively (Geometrical interpretation is usually very useful). Secondly, find an example for each of the topic. You should be able to find those in the tutorial problems, past tests, and suggested problems from the textbook. I did not make a review sheet containing every formulas and graphs as you might expect, because you will get more out of making one yourself. **Notice:** The list may not cover everything you will be tested on.

1. Intuition \rightarrow Setup Integration model \rightarrow Computation
2. Unfortunately, there is not much I can include in the checklist for chapter 14 on integration. The best to prepare for the test on this chapter is to practice more. We will go through some examples in the review session.
3. section 15.1 Double Integrals over Rectangles
 - What is the intuitive idea of double integral of a function in terms of volume?
 - (15.1.5) What is the definition of the double integral of f over the rectangle R ?
 - (15.1.10) What is the Fubini's theorem?
 - (15.1.Q.37-43) Can you set up an integration model to compute the volume? What is the trick in general to set up the model?
 - Review the derivatives of trigonometric functions, for example, what is the derivative of $\tan x$?
 - Review the trigonometry identity, for example $\sin(2x) = 2\sin(x)\cos(x)$
4. section 15.2 Double Integrals over General Regions
 - Can you sketch of 2-dimension region of integration in the x - y plane?
 - (15.2.3-5) How do you find the range of integration when you change the order $dx dy$ to $dy dx$?
 - (15.2.10) What does $\iint_D 1 dA$ represents?
 - (15.2.11) Given the minimum and maximum of a function f and the area of the region, can you estimate the value of the integral?

- (15.2.Q41-44) How do you set up the model to find the volume bounded the curves defined by functions? (Inside or Outside of a function?)

5. section 15.3 Double Integrals in Polar Coordinates

- How do you change from Cartesian coordinate (x,y) to polar coordinate (r, θ) ?
- How do you change from Cartesian coordinate to polar coordinate in a double integral? (This is not the same question as the previous one) In particular, how do you find the range?
- Can you sketch a region given in polar coordinate?

6. section 15.4 Application of Double Integrals

- (15.4.5) Given the density function, how do you find the mass of a region?
- What condition must a probability density function satisfy? How do you calculate the probability within an interval?

7. section 15.5 Surface Area

- (15.5.2) How do you calculate the area of the surface with equation $z = f(x,y)$, where (x,y) belongs to some region D ?

Different from the previous chapter on derivative,
integration can be "painful" when you have no idea how to start
or you just dont remember how to compute the integrals,
and the best way to overcome the difficulty is to
practice, practice and practice until you become more comfortable
Good luck on your test, and remember a grade does not define you. :) -Nick