Math 242 Test 1 Study Guide
1.09, 2.05, VC.01 - VC.03

This guide lists the important concepts from each of the lessons that you should be comfortable with prior to taking the test. If you have any uncertainties about these concepts, you should refer back to the appropriate Basics, Tutorials or GiveItaTry sections. The best way to test your understanding is to work out the problems from the Literacy Sheets of each lesson. Also, retaking the Mallard quizzes may be beneficial.

1.09 Parametric Plotting

⟶ Parameterizing a curve y = f[x] into the form {x[t],y[t]}
⟶ Calculating the derivative, f'[x], of the curve y = f[x] given in parametric form {x[t],y[t]}.
⟶ Plotting a given parametric curve {x[t],y[t]} for an interval $a \le t \le b$.
⟶ Using the parametric form, {x[t],y[t]} to spot maximum/minimum x and y values.
⟶ Parametric plotting of circles, tubes and horns in three dimensions
⟶ Using parameterization to make surfaces by rotating curves.

VC.01 Vectors Point the Way

⟶ Vector fundamentals (vector algebra, dot product, etc.)
⟶ Measurements using vectors (angles, length/distance, component, etc.)
⟶ (Push / Component / Projection) of a vector along another vector. Understand the concept and know the formula.
⟶ Velocity and acceleration.
⟶ Line fundamentals (parameterization, analyzing intersection of two lines, etc.)

VC.02 Perpendicularity

⟶ Plane fundamentals (xyz-equation, parameterization, normal vector, direction vectors, analyzing intersection of two planes etc.).
⟶ Plotting on planes.
⟶ Plotting tubes and ribbons using the unittangent, mainunitnormal and binormal vectors of a 3D curve.
⟶ Using the product rule to break acceleration vectors into normal and tangential components
⟶ Cross product (calculation, the direction of the resulting vector, measurement etc.)

VC.03 The Gradient

⟶ Calculating the gradient vector and interpreting it's direction.
⟶ What is a level curve of a 3D function? What is a level surface of a 4D function?
⟶ The relation between the gradient vector of a function to its' level curves/surfaces.
⟶ Locating the crests and dips of a function using gradients.
⟶ Linearizations and total differentials of a function. What is it good for? How do you find it?

2.05 2D Integrals and the Gauss-Green Formula

⟶ Area and volume measurements using double integrals.
⟶ Calculating double integrals by method of least labor.
⟶ Application of Gauss-Green formula to calculate double integrals.