

Calculus III MAC2313 Final Exam Preparation

(The final exam will consist of open-ended questions)

The problems will be similar to the ones below but *not necessarily exactly like the ones below*. For example, in 1, the exam problem could be, "find the parametric equations of a line through a point that is parallel to a given plane", or, "find the parametric equations of a line through two given points". Reference to a *similar* exercise in each category is provided where possible as (ref: page-exercise)...also **look at ones close by**...

Note: Questions will not necessarily be in the same order as below.

Students should be prepared to do the following:

1. In 3-D, find the parametric equations of a line through a point that is perpendicular to a given plane (ref: 745-12)
2. Find the relative extrema and identify as a minimum, maximum or saddle point (ref: 892-7)
3. From two sets of parametric equations, find the equation of a plane that contains the lines (ref: 745-35)
4. Set up the limits for a double integral given a region described as a graph (ref: 931-130)
5. Evaluate a double integral (ref: 921-35)
6. Find f_{xy} (ref: 847-47)
7. Find the derivative of $z = f(x, y)$ along a vector $a\mathbf{i} + b\mathbf{j}$ at a point (x_0, y_0) (ref: 874-1)
8. Find the equation of the tangent plane to $z = f(x, y)$ at a point (x_0, y_0, z_0) (ref: 883-15)
9. Set up (only) an integral using spherical coordinates to find the mass of a portion of a sphere where the density function is given (ref: 961-4b and 963-5 mass only)
10. Find the volume of the region bounded above by a paraboloid, laterally by a circle and below by the xy -plane (ref: 973-26)
11. Find the work done by the vector field \mathbf{F} along a vector $\mathbf{r}(t)$ (in 3-D) where $0 \leq t \leq a$ (ref: 1007-33)
12. Evaluate a line integral (ref: 1017-31)
13. Evaluate $\int f(x, y)dx + g(x, y)dy$ along a circle of radius a (ref: 1016-17)
14. Evaluate $\int f(y)dx + g(x)dy$ along C where C is the boundary of a triangle with given vertices (ref: 1025-1)
15. Draw two 3-D graphs from their equations (ref: 756-19)