Quiz Study Guide

MA 261 · Fall 2023

Quizzes:

- Quizzes are given weekly on Tuesdays during Recitation. They must be taken in-person.
- Two problems – each chosen from a pool of past exam problems (green column below).
  - View the problems on the Past Exam Archive: https://www.math.purdue.edu/academic/courses/oldexams.php?course=MA26100
  - Naming Convention:
    - F18FE#1 – Fall 2018 Final Exam Question #1
    - S19E1#7 – Spring 2019 Exam 1 Question #7
- One problem will be graded for partial credit. The other will be graded as multiple choice (all or nothing).
- Quizzes are 15 minutes long and will take place during the last 15 minutes of the recitation (from X:05 – X:20)

#	Lesson:	Sec:	Quiz:	You should be able to:	You should know:	Past Exam Problems:
1	Review of Vectors	13.1 13.2 13.3 13.4	1	- Compute vector operations - Find magnitude of a vector - Find a position vector - Find the equation of a sphere, ball, or circle - Find equations of simple planes - Compute dot products - Find angles between vectors - Calculate orthogonal projections - Compute cross products - Find areas of parallelograms and triangles - Find orthogonal vectors	Vector, scalar, magnitude, zero vector, position vector, unit vector, parallel, sphere, ball, circle, plane, dot product, orthogonal, orthogonal projection, cross product, determinant, coordinate unit vectors ($\mathbf{i}$, $\mathbf{j}$, $\mathbf{k}$)	Few exam questions test these concepts directly. However, you will need these concepts to complete the more difficult questions from the past exams. S18E1#4 S18FE#1 S16E1#1
2	Lines & Planes in Space	13.5	1	- Find equations of lines and line segments - Find equations of planes - Determine whether planes are parallel, intersecting, or identical - Find intersections between lines and/or planes	Parallel, intersecting, skew, orthogonal planes	S19E1#1 S19E1#2 S19FE#1 F19E1#1 F19FE#1 F18E1#1 F18FE#1

#	Lesson:	Sec:	Quiz:	You should be able to:	You should know:	Past Exam Problems:
3 4	Quadratic Surfaces	13.6	2	- Sketch graphs of cylinders and quadratic surfaces - Identify surfaces from equations	Trace, elliptic paraboloid, ellipsoid, cylinder, elliptic cone, hyperboloid of one sheet, hyperboloid of two sheets, hyperbolic paraboloid	S19FE#2 F19E1#2 S18E1#1 F18E1#3 F18FE#2
5	Vector-Valued Functions	14.1	2	- Graph curves described by vector-valued functions - Find domains of vector-valued functions - Find the intersection of planes and curves defined by vector-valued functions	Vector-valued function, domain, limit of a vector-valued function	S22E1#4 S19E1#3 F19FE#2 F18E1#2 F16E1#4 S14E1#9
6	Calculus of Vector-Valued Functions, Motion in Space	14.2 14.3	3	- Find first derivatives of vector-valued functions - Find tangent vectors and tangent lines for vector-valued functions - Evaluate definite integrals of vector-valued functions - Find velocity, speed, and acceleration of objects	Tangent vector, unit tangent vector, tangent line, derivative rules	S18E1#2 S18E1#3 S17E1#3 S16E1#5
7	Motion in Space	14.3	3	- Compare trajectories of objects - Solve applications involving 2d and 3d motion	Velocity, acceleration, trajectories	S19E1#6 S19FE#20 F19E1#3 F19E1#6 S18FE#3 F18E1#6
8	Length of Curves, Curvature	14.4 14.5	3	- Find arc lengths of vector-valued functions - Parameterize curves by arc length - Find unit tangent vectors and curvatures - Use velocity to find curvature	Arc length, curvature	**Arc Length** S19E1#5 F19E1#5 F19FE#3 S18FE#2 **Curvature** S19E1#4 F19E1#4 F18E1#4

#	Lesson:	Sec:	Quiz:	You should be able to:	You should know:	Past Exam Problems:
9	Functions of Several Variables	15.1	4	- Find domains of functions - Graph surfaces - Graph level curves of functions	Function of several variables, level curves	S19E1#7 S18E1#5 F18E1#7
10	Limits and Continuity	15.2	4	- Evaluate limits of functions - Evaluate limits at boundary points - Determine where functions are continuous	Limit laws, boundary point, interior point, two-path test, continuity	F19E1#7 F18E1#8 S17E1#6
11	Partial Derivatives	15.3	4	- Find first partial derivatives - Find second partial derivatives	Partial derivative, differentiable,	S19E1#8 S19FE#7 F19E1#8 F19FE#6
12	The Chain Rule	15.4	5	- Use the chain rule to find derivatives - Differentiate implicitly - Evaluate partial derivatives at specified points	Chain rule, implicit differentiation	S19E1#9 F19FE#7 S18FE#5 F18E1#10 F18FE#5
13	Directional Derivatives and the Gradient	15.5	5	- Compute gradients and/or directional derivatives - Find directions or paths of change - Compute slopes of lines tangent to level curves	Gradient, directional derivative, directions of change, level curves, steepest descent	S19E1#10 S19FE#8 F19E1#9 F19FE#4 S18FE#7 F18E1#11 F18FE#4
14	Tangent Plane and Linear Approximation	15.6	5	- Find equations of planes tangent to surfaces - Find linear approximations - Use differentials to approximate changes in functions	Tangent plane, differential, linear approximation	S19E1#11 S19FE#5 F19FE#5 S18FE#6 F18E1#9 F18FE#3
15 16	Maximum and Minimum Problems	15.7	-	- Find and analyze critical points for functions - Find local and absolute extrema for functions	Local extrema, critical point, saddle point, second derivative test, absolute extrema	S19E1#12 S19FE#9 F19E1#10 F19E1#11 F19FE#8 S18FE#9 F18FE#7 F18E1#12 F18E2#1

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17	Lagrange Multipliers	15.8	6	- Use Lagrange multipliers to find extreme values	Lagrange multiplier	S19E2#1 F19E2#1 F18FE#6 F18E2#2
18	Double Integrals in Rectangular Regions	16.1	6	- Evaluate iterated integrals - Evaluate double integrals over rectangular regions - Compute average values of functions over plane regions	Double integral, average value	F19E2#2 S18E2#2 F18E2#3
19	Double Integrals over General Regions	16.2	6	- Evaluate double integrals over general regions - Change the order of integration	Order of integration	S19E2#2 ~~S19E2#4~~ S19FE#10 F19E2#3 F19FE#9 F18E2#4
20	Double Integrals in Polar Coordinates	16.3	6	- Find volumes of solids using polar coordinates - Evaluate double integrals using polar coordinates	Polar coordinates	S19E2#3 S19FE#11 F18FE#8 F18E2#5
21	Triple Integrals	16.4	7	- Find volumes of solids using triple integrals - Evaluate triple integrals - Change the order of integration	Triple integrals	S19E2#5 S19FE#12 F19E2#4 F18FE#9 F18E2#7
22 23	Triple Integrals in Cylindrical and Spherical Coordinates	16.5	7	- Evaluate triple integrals in cylindrical and spherical coordinates	Cylindrical coordinates, spherical coordinates	**Cylindrical** S19E2#6 S19FE#13 F19E2#5 F19FE#10 S18FE#8 F18E2#9 F18E2#8 **Spherical** S19E2#7 S19FE#14 F19E2#6 F19E2#7 F18E2#10 F18FE#10 F18FE#11

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24	Integrals for Mass Calculation	16.6	8	- Find centers of mass of two-dimensional objects - Find centers of mass of three-dimensional objects - Calculate the mass of variable density solids	Center of mass, variable density	F19E2#8 S18FE#10 F18E2#6
25	Vector Fields	17.1	8	- Graph vector fields - Find gradient fields for a given potential function	Vector field, radial vector field, potential function, equipotential curves, flow curves, streamlines.	S19E2#8 F19E2#9 F18E2#11 F18E2#12
26 27	Line Integrals of Functions and Vector Fields	17.2	8 (Only Less. #26 – scalar line ints)	- Evaluate line integrals - Find the work required to move an object on an oriented curve - Find the circulation and flux of a vector field on a plane curve	Line integral, work, circulation, flux	**Scalar:** S19E2#10 F19E2#10 F19E2#11 F19FE#11 **Vector:** S19E2#9 S19FE#15 ~~F19FE#19~~ S18FE#12 F18FE#12
28	Conservative Vector Fields & the Fundamental Theorem of Line Integrals	17.3	9	- Determine whether a vector field is conservative and find potential functions - Evaluate line integrals - Compute the work done in force fields	Conservative vector field, potential function, Fundamental Theorem for Line Integrals, independent of path	S19FE#3 F19FE#12 F18FE#13
29	Green's Theorem	17.4	9	- Use a line integral to determine the area of a region - Use Green's theorem to evaluate line integrals - Find the circulation and flux across the boundary of a region	Green's Theorem, two-dimensional curl, two-dimensional divergence, stream function, Laplace's equation	S19FE#4 F19FE#13 F19FE#14 S18FE#13 F18FE#16 F18FE#14
30	Divergence & Curl	17.5	9	- Find the divergence of vector fields - Find the curl of vector fields	Divergence, Curl, source-free, irrotational	S19FE#6 F19FE#15 S18FE#14 F18FE#15

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31 32 33	Surface Integrals	17.6	10	- Find a parametric description of a surface and describe surfaces parametrically - Find the surface area using the parametric description of a surface - Evaluate surface integrals - Evaluate flux integrals	Surface integral	**Scalar** S19E2#4 S19FE#16 S19FE#17 S18FE#15 S18FE#16 S18FE#17 F19FE#16 F18FE#17 **Vector** S18FE#18 F19FE#17 F18FE#18
34 35	Stokes' Theorem	17.7	-	- Use Stokes' Theorem to evaluate line integrals and surface integrals - Use Stokes' Theorem to find circulation	Stokes' Theorem	S19FE#18 F19FE#19 S18FE#19 F18FE#19
36 37	The Divergence Theorem	17.8	-	- Use the Divergence Theorem to compute net outward flux	Divergence Theorem	S19FE#19 F19FE#18 F19FE#20 S18FE#20 F18FE#20