

Fast-Track Calculus Minimum Topics Studied 2003-2004

MA 111

1. Simple Maple commands, plotting, functions, modeling, implicit functions, parametric equations.
2. Parametric equations
3. inverse functions (trig, logs, exponentials)
4. basic vectors (dot product, projections)
5. Limits and continuity.
6. rate of change, derivative
7. tangent and normal lines.
8. differentiation techniques review
9. implicit differentiation
10. Mean Value theorem, Extreme Value theorem
11. concavity
12. optimization problems
13. Taylor Series
14. Newton's Method
15. Antidifferentiation,
16. area and Riemann sums, the definite integral

Additional Topics possible to include:

1. Related Rates

MA 112

1. integration techniques:
 - a. u-substitutions
 - b. integration by parts.
 - c. partial fractions
2. Numerical integration: trapezoidal rule, Simpson's Rule
3. Applications:
 - a. volumes of revolution (disks)
 - b. volumes of revolution (shells)
 - c. arc length
 - d. surface area of revolution
 - e. work.
4. Differential Equations:
 - a. separable differential equations
 - b. exponential growth
 - c. logistics equation.
 - d. Newton's Law of Cooling
 - e. falling body (variable acceleration)
 - f. Motion (Newton's Law), falling body with wind resistance, projectile Motion
 - g. mixing problems.
5. sequences and series:

- a. telescoping series
 - b. geometric series
 - c. ratio test
 - d. integral test
 - e. power series and Taylor series
6. Improper Integrals
 7. L'Hopital's rule

Additional Topics possible to include:

1. first order linear ordinary differential equations,

MA 113

1. Vectors operations (cross product, triple scalar product)
2. equations of planes and lines in space
3. quadric surfaces
4. curvature, space curves
5. Normal and Tangent vectors in three space
6. Normal and Tangential components of acceleration
7. Partial derivatives
8. implicit differentiation
9. derivatives of parametric equations, motion in the plane.
10. Chain Rule
11. Gradients
12. directional derivatives
13. Taylor Series in two variables
14. tangent plane and normal lines
15. max/min in three space.
16. Lagrange multipliers,
17. least squares.
18. Double Integrals
19. Applications of double integrals:
 - a. area (double integral)
 - b. Volume (double integral),
 - c. Center of mass (two-space)
 - d. centroid (two-space)
 - e. moments of inertia (two-space)
20. Triple integrals, iterated triple integrals
21. Applications of triple integrals
 - a. Center of mass (three-space)
 - b. moments of inertia (three-space)
22. polar coordinates and Area (polar coordinates)
23. cylindrical coordinates
24. volume in cylindrical coordinates (change of coordinate systems)
25. Spherical Coordinates, volume in spherical coordinates.