

Review Topics for Math 17B

Chapter 6

1. evaluating definite integrals
 - a. using the definition
 - b. using area formulas
 - c. using the Fundamental Theorem of Calculus
2. differentiating functions defined by integration (using the FTC)
3. applications of the definite integral
 - a. area of a plane region
 - b. average value of a function
 - c. volume of a solid of revolution
 - d. length of a curve
 - e. distance and displacement

Chapter 7

1. integration techniques
 - a. substitution
 - b. integration by parts
 - c. partial fractions
2. improper integrals
 - a. infinite limits of integration
 - b. infinite discontinuities
 - c. comparison test for improper integrals
3. numerical integration
 - a. midpoint rule
 - b. trapezoidal rule
 - c. Simpson's rule
4. Taylor approximations
 - a. Taylor polynomials
 - b. Taylor's formula for the remainder

Chapter 8

1. solving pure time DEs
2. solving separable (including autonomous) DEs
3. autonomous growth models
 - a. exponential growth
 - b. logistic growth

- c. logistic growth with a threshold (Allee effect)
- d. logistic growth with harvesting (Gordon-Schaefer model)
- e. von Bertalanffy growth
- 4. equilibria and stability
 - a. graphical approach
 - b. analytic approach
- 5. one-compartment problems
- 6. solving first-order linear DEs

Chapter 9

- 1. solving linear systems using matrix reduction
- 2. matrix operations
 - a. addition
 - b. scalar multiplication
 - c. matrix multiplication
 - d. transposes
- 3. determinants of 2×2 matrices
- 4. inverses of matrices
 - a. finding 2×2 inverses
 - b. finding $n \times n$ inverses
 - c. relation between invertibility and $\det(A)$
 - d. relation between invertibility and solutions of $Ax=0$
- 5. Leslie matrices
- 6. linear transformations
 - a. definition
 - b. finding the matrix for a linear transformation
 - c. rotations
- 7. eigenvalues and eigenvectors
 - a. definition
 - b. finding eigenvalues and corresponding eigenvectors
 - c. relation between eigenvalues and $\text{tr}(A)$ and $\det(A)$
 - d. finding when a matrix has eigenvalues with negative real parts
 - e. finding powers of matrices multiplied by vectors
 - f. finding long-term growth using Leslie matrices
- 8. vectors
 - a. length of vectors
 - b. normalizing vectors
 - c. dot product
 - d. angle between two vectors
 - e. perpendicular (orthogonal) vectors
- 9. parametric equations for lines
- 10. equation for a plane