Honors Calculus and AP Calculus AB
F. Dellinger
Room 614

Calculus requires dedication, a commitment to study, a love of math, and a never give up attitude in order to be successful. It is not at all uncommon to expect an hour of work outside of class on a daily basis. Although assignments themselves may vary in length, ***there should be daily studying in order to maximize success***. Calculus is a course that builds daily. The skill set learned on day one will still be needed on day one hundred eighty. Each step is therefore crucial. Plan to carefully correct and review difficult topics/questions from homework, tests, and quizzes in order to be successful as the class continues.

The main goal of Honors and AP Calculus AB is to prepare students to take the AP Exam in May. Students who score a 3 or higher on the exam will, in most cases, receive a semester of college credit. (Course credit varies from institution to institution and students should check with the colleges they are applying to for specific information.) The AP Exam itself is divided into two main parts, one multiple choice and one open ended. Each of these parts is further divided into a calculator active and a calculator inactive portion. This means that approximately 55-60% of the AP Exam is non-calculator. Therefore, many of our assignments and tests will be completed without the aid of a calculator. Students will be expected to know how to graph basic functions, evaluate trig functions, and simplify algebraic expressions (including fractions) without calculators.

The multiple-choice section of the AP Exam is graded by determining the number of correct responses. The AP Exam is a timed test. In order to have the opportunity to at least look/attempt all the questions, the non-calculator multiple-choice questions should be completed in approximately 2 minutes per question. Thus, speed of calculation as well as accuracy are important. Students have approximately 3 minutes per question on the calculator active multiple-choice section.

The open-ended section of the AP Exam contains six questions, two with and four without a calculator. These questions should be

completed in 15 minutes each in order to have an opportunity to attempt each question. All open-ended questions are graded on a rubric with a maximum of nine possible points per question. Throughout the course, we will practice questions using similar rubrics and discuss how to maximize points.

Mark your calendars: AP Calculus AB Exam Monday, May 13, 2024

Topics Covered in Honors and AP Calculus AB:
Topics listed below will be covered at some point during Honors Calculus in the fall semester or AP Calculus AB in the spring semester. The topics will not always be presented in the order of the outline below.

I. **FUNCTIONS, GRAPHS, and LIMITS**
   A. Analysis of Graphs
      a. Predict and explain local behavior of a function
      b. Predict and explain global behavior of a function
   B. Limits of Functions
      a. Understand the limiting process
      b. Calculate limits algebraically
      c. Calculate limits graphically
      d. Calculate limits from tables
   C. Asymptotic and Unbounded Behavior
      a. Understand asymptotes graphically
      b. Describe asymptotic behavior in limits involving infinity
      c. Compare functions and rates of change (Contrast exponential growth, polynomial growth, and logarithmic growth.)
   D. Continuity
      a. Definition of continuity
      b. Understanding continuity in terms of limits
      c. Intermediate Value Theorem
      d. Extreme Value Theorem

II. **DERIVATIVES**
   A. Concept of the Derivative
      a. Describe derivatives graphically, numerically, and analytically

b. Derivatives as instantaneous rates of change
c. Derivatives as limits of difference quotients
d. Relationship between differentiability and continuity

B. Derivative at a point
a. Derivative is the slope of the tangent line at that point
b. Local linear approximations
c. Instantaneous rate of change as the limit of average rate of change
d. Approximate the rate of change from graphs and tables

C. Derivative as a function
a. Characteristics of functions and derivatives
b. First derivative test and extrema
c. Mean Value Theorem
d. Differential equations

D. Second derivatives
a. Characteristics of functions, derivatives, and second derivatives
b. Concavity and the sign of the second derivative
c. Points of inflection

E. Applications of derivatives
a. Analysis of curves including mins/maxs and concavity
b. Optimization
c. Related Rates
d. Implicit differentiation
e. Inverse functions
f. Position, velocity, and acceleration problems
g. Slope fields
h. Differential equations

F. Computation of derivatives
a. Basic derivative rules
b. Product and quotient rules
c. General power rules
d. Derivatives of exponential, logarithmic, and trig functions
e. Derivatives of power functions and inverse trig functions

III. **INTEGRALS**
    A. Interpretations and Properties of Definite Integrals
        a. Riemann sums using left, right, and midpoint evaluation points
        b. Definite integrals as Riemann sums
        c. Definite integrals as the rate of change over an interval
        d. Basic properties of integrals
    B. Applications of Integrals
        a. Area of a region
        b. Volume of solids of revolution
        c. Volume of solids with known cross-sections
        d. Average value of a function
        e. Position, velocity, and acceleration
    C. Fundamental Theorem of Calculus
        a. Use the fundamental theorem to evaluate definite integrals
        b. Use the fundamental theorem to represent a particular antiderivative
    D. Techniques of Antidifferentiation
        a. Antiderivatives following directly from basic derivative rules
        b. Integration by substitution
        c. Integration by parts
    E. Applications of Antidifferentiation
        a. Finding specific antiderivatives using initial conditions
        b. Solving separable differential equations
        c. Exponential growth and decay
    F. Numerical approximations to definite integrals
        a. Riemann sums
        b. Trapezoidal rule

Class Expectations:
Attendance in class is an essential component for student success.

Make-up Work:
In the event of an absence, the following policies apply.
It is the *student's* responsibility to get the assignments after an absence. If any copies are needed that are not in Canvas, ask Mrs. Dellinger. **Students have THREE DAYS in which to complete work missed UPON RETURNING.**

Tardy Policy:
1st Tardy   Warning
2nd Tardy   Parent Contact
3rd Tardy and beyond = Office Referral

Class Rules and Consequences:
1. Follow all school rules and policies.
2. Be prepared for class; bring all necessary materials.
3. Be respectful of others.
4. Be in assigned seat when the tardy bell rings.

Note: Consequences for misbehavior will follow those outlined in the student handbook. With the exception of severe offenses, after school detention will be assigned before a student is referred to the office.

Electronic Device Policy:
Only school-issued Chromebooks are allowed to access information in Canvas. NO CELL PHONES!!

Food and Drink Policy:
Only water is allowed in the classroom. No eating/snacks.

Calculators:
The TI-83 or TI-84 plus calculator will be used throughout the semester. We have a limited number of calculators that may be assigned to a specific student for use during their assigned class period. Students must understand that they are responsible for the calculator while it is in the student's possession.

NLHS Mission Statement:
The mission of North Lincoln High School is to activate student dreams and opportunities through excellence in academics, altruism, arts, and athletics.

NLHS Math Department Mission Statement:
The North Lincoln Math Department will encourage all students to achieve their full mathematical potential and to use the math and analytical skills acquired to become life-long learners and contributing citizens.

Grading Policies and Procedures:

Grading:
Homework/ Classwork   15%
Quizzes   25%
Tests   60%

I will enter grades into PowerSchool within 10 days of the assignment collection/submission date.

This course has a teacher-made final exam that counts as 20% of the final course grade. Students may exempt the final exam by meeting the criteria outlined in the student handbook.

Homework/Classwork:
Homework is assigned on a regular basis. Completion is essential to success. Calculus will not just come to most people. It requires work and practice. Therefore, homework grades will be entered based upon completion. A good faith attempt at all assigned problems will earn a grade of 100. Any missing problems will result in a lowered homework grade for that assignment. As outlined in the student handbook, late papers will have 10 points deducted per day late. Assignments turned in following an absence are not counted as late unless they are not turned in within three days following the return

from an absence. If a classwork grade will be determined based on accuracy, I will notify you.

Quizzes:
Quizzes may be announced or unannounced. Pop quizzes will be administered on a regular basis. Quizzes often cover review material as well as the topic of the previous day. As a quiz, the grade is determined based on the correctness of the answers.

Each week (usually on Wednesday), there will be an AP Review Quiz during the first 30 minutes of class. These quizzes will consist of 6 multiple-choice questions and one open-ended question. The open-ended question will be graded on the AP rubric and the multiple-choice questions will be graded as either correct or incorrect. The final quiz grade will be determined from a maximum of 15 possible points. The open-ended question is worth 9 of the 15 points. The multiple-choice is worth up to 6 points (1 per question). The total number of points for the multiple-choice section will be determined by the number of correct answers in that section, one point per problem. Questions left blank are worth zero points. After the total number of points is determined, a conversion will be made to a 100- point scale. Some of these quizzes will be non-calculator and some will be calculator active. They are cumulative in nature and cover material from the entire course.

Tests:
Tests are always announced, usually no fewer than two days before the test. As with quizzes, it is common for the tests to contain some review items. In addition, many of the tests will contain questions in AP format. There will be no partial credit on multiple choice sections. AP open ended questions will be graded on a rubric like that used on the AP exam. A conversion will then be made to the standard 100-point scale.

In the event of a poor test performance, ***students may elect to retake one and only one test per grading period.*** If a test is retaken, the ***__average__*** of the two tests will replace the old test grade.

Materials:
1. Paper/notebook
2. Pen or dark pencil
3. Graphing calculator – TI-83+, 84, or 84+ highly recommended

<u>Contact Me</u>:

I can be reached by e-mail at fdellinger@lincoln.k12.nc.us. I can also be reached by phone at North Lincoln High School 704-736-1969 between 3:15 and 3:45pm or during my planning period. I will make every effort to reply to messages left during the work week within 24 hours of receiving the message.