**AP® Calculus BC**
**Summer Work**

Step 1: Read the course syllabus. Familiarize yourself with the expectations of the course. Make sure you understand these expectations especially items regarding academic integrity.

Step 2: You will be working through the first 3 sections of Chapter P (Precalculus). The text can be accessed at: http://teacherpress.ocps.net/cynthiaandrews/files/2013/06/Calculus-9th-Edition-by-Ron-Larson-Bruce-H.-Edwards.pdf (or search for Larson Calculus). This is the 9th edition of the textbook rather than the 10th edition but the content is the same. Read each section thoroughly making sure that you understand all of the terms listed below for each section

Step 3: Do the problems on the attached worksheets. Make sure you can do each type of problem that is listed. **It is important that you are able to show your work in a clear, logical format.** The graders of the AP® exam aren't going to spend a whole lot of time trying to decipher your work. You need to make it as clear to them as possible in order to get the most credit.

Step 4: Have the assignments ready to be **turned in on the 1st day** of class, August 16. We will spend some time on that day discussing the expectations of the course and then start through Chapter P.

Step 5: On the 2nd and 3rd day of class, I will be taking questions from you regarding the material from Chapter P

Step 6: On the 4th day of class, August 21, there will be a test over all the material from the first 3 sections of Chapter P.

**Section P.1: Graphs and Models**

terms
- graphically
- analytically
- numerically

problems
- find intercepts (x-intercepts and y-intercepts) analytically
- identify symmetries analytically
  - with respect to the x-axis
  - with respect to the y-axis
  - with respect to the origin
- find intersections of two functions graphically and analytically

**Section P.2: Linear Models and Rates of Change**

terms
- slope formula
- parallel lines
- perpendicular lines
- equations of lines
- point slope form
- slope-intercept form
- standard (general) form

problems
- find slopes of lines
- write equations of lines
- switch from one form of a linear equation to another
  - (note: **an** equation can be in any form
    **the** equation must be in standard form)

**Section P.3: Functions and Their Graphs**

terms
- relation
- function
- vertical line test
- domain/range
- implicit equation
- explicit equation

problems
- perform a transformation on a graph
- perform a composition of functions
- determine analytically if a function is even or odd

# WORTHINGTON KILBOURNE HIGH SCHOOL

**AP® Calculus BC** Doug Troutner

Syllabus Course #3380

**Textbook: *Calculus***

Email: dtroutner@wscloud.org

**OVERVIEW**

AP® Calculus BC is a college level course designed for students planning on taking the advanced placement exam on May 15, 2018. The major topics covered in this course will include elementary functions, derivatives, and integrals, as well as their applications.

**SUPPLIES**

Each student will be given access to the online text *(Calculus, 10th edition, Larson, Edwards)*. A limited number of physical textbooks will be available. This book will be used on a daily basis as it is the primary source for problems.

Each student will need to bring a programmable graphing calculator with them to class each day. Calculators are permitted on portions of the AP® exam, therefore proper usage must be learned.

**GENERAL PROCEDURES**

Typical class time in AP® Calculus BC will consist of lecture, discussion, and problem solving.

**STUDENT RESPONSIBILITIES**

Students are expected to follow the building rules as set forth in the student handbook.

In addition, if a student is absent from class, they have the responsibility to:

get notes from a fellow student.

upon returning to class, hand in any assignments due during their absence, pick up any material passed out during their absence, and schedule a time for making up a test, if applicable.

If a student has a pre-excused absence (field trip, appointment, vacation, etc.), all assignments are still due as scheduled. If there is a test scheduled, the student must make arrangements **prior** to their absence.

**ASSESSMENTS**

Quarter grades will be based upon quizzes, and tests. Each "chapter" consists of:

30 points of quizzes
100 point test

<u>Homework</u>

Students will receive homework assignments for each section. Some assignments will be graded according to completion while others will be graded for completeness and accuracy. Points for completion will only be awarded if there is some evidence of effort. An answer, by itself, does not imply effort. Homework is due at the start of class. Late homework will **not** receive credit.

Quizzes

Quizzes covering one to three sections will be given to evaluate a student's progress prior to the test. Quizzes are unannounced and are designed to take 5 to 10 minutes. In the event of an absence on the day of a quiz, the student's quiz grade will be based on their test score.

Tests

Students will demonstrate their knowledge of a chapter's topics through tests. Tests will be given at the end of each chapter or in the middle of some longer chapters. Tests may include questions covering material from previous chapters. Tests are announced a week in advance.

Exam

A semester exam will be given at the midpoint and end of the course. The format of the exam will be similar to that on the AP® exam. This exam will be worth 20% of the semester grade. (A 100 point **comprehensive test** will be given near the conclusion of the course.)

AP® Exam

The AP® exam will be administered on May 15, 2018. Most colleges will award college credit for qualifying scores on this exam. The score has no effect on a student's grade in this course.

Grading Scale

Floating 90 - 80 - 70 - 60.

**ACADEMIC INTEGRITY**

All students are expected to demonstrate the utmost in terms of honesty and academic integrity. The following examples, although not exhaustive, can be used as guidelines:

Homework

Although students are encouraged to "work together", not all types of "working together" are ethical.

- Two students, both contributing to the discussion, arrive at an answer. **ETHICAL**
- One student, without his paper present, asking another what steps are necessary to solve a problem. **ETHICAL**
- One student, with his paper present, asking another what steps are necessary to solve a problem. **CHEATING** (The difference is that the student doesn't have the opportunity to actually understand before writing it down.)
- One student possessing someone else's paper while the owner of the paper is not present. **CHEATING**
- If the problem you are doing requires the use of a calculator and you are not the one typing it into the calculator, you are using someone else's work. **CHEATING**

Quizzes, Tests, Exams

All of the following, although not exhaustive, are **CHEATING**.

- Looking at someone else's paper, regardless of whether or not any answers are used.
- Asking for, or giving, information about the material covered on the quiz/test/exam.

In any instance of cheating, the person offering the information receives the same penalty as the person seeking the information!

**TIPS FOR SUCCESS**

Notes

You are the expert on how you best learn. Watch. Listen. Take notes. Study.

Homework

On multiple day assignments, do as many problems as possible (they may not be the first ones) the first day. You may have time on the second day to ask questions. If you haven't started the assignment, you can't ask good questions.

Quizzes

Since the quizzes are unannounced, expect one each day and anticipate the questions which will be asked.

Tests

Begin studying early. Use the quizzes to help your review. Also, review previous tests for the cumulative questions.

General

Don't allow yourself to fall behind. Do your homework on a timely basis. Come to class prepared with good questions. If you are having problems, see me as soon as possible.

**AP® Calculus BC** **Name:**_____
**Summer Work #1** **Period:**_____

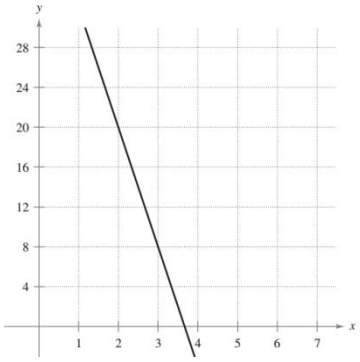
Solve the following problems on another sheet of paper. Be sure to show your work in a clear, logical format.

Section P.1

1. Find all intercepts: $y = x^2 + x - 2$
2. Find all intercepts: $y = x^2\sqrt{25 - x^2}$
3. Find all intercepts: $y = \frac{3(2-\sqrt{x})}{x}$
4. Determine the symmetries for: $y = x^2 - 2$
5. Determine the symmetries for: $xy = 4$
6. Find the points of intersection of the graphs of:
   $x + y = 2$
   $2x - y = 1$
7. Find the points of intersection of the graphs of:
   $x^2 + y = 6$
   $x + y = 4$
8. Find the points of intersection of the graphs of:
   $x^2 + y^2 = 5$
   $x - y = 1$

Section P.2

1. Use the graph below to estimate the slope of the line.




2. Make a sketch of the lines through the point (2, 3) with the given slopes.
   a) m = 1
   b) m = -2
   c) m = $-\frac{3}{2}$
3. Plot the points (2, 1), and (2, 5) and find the slope of the line between them.
4. Find the slope and the y-intercept of the line:
   $x + 5y = 20$
5. Write an equation for the line through (3, -2) with a slope of 3.
6. Write the equation for the line through (5, 1) and (5, 8).
7. Find a linear equation that expresses the relationship between the temperature in degrees Celsius, C, and degrees Fahrenheit, F. Use the fact that water freezes at 0°C (32°F) and boils at 100°C (212°F). Use your equation to convert 72°F into degrees Celsius.
8. A real estate office handles an apartment complex with 50 units. When the rent is $580 per month, all 50 units are occupied. However, when the rent is $625, the average number of occupied units drops to 47. Assume that the relationship between the monthly rent *p* and the demand *x* is linear.
   a) Write a linear equation giving the demand *x* in terms of the rent *p*.
   b) Use your equation to predict the number of units occupied when the rent is $655.
   c) Use your equation to predict the number of units occupied when the rent is lowered to $595.

Section P.3

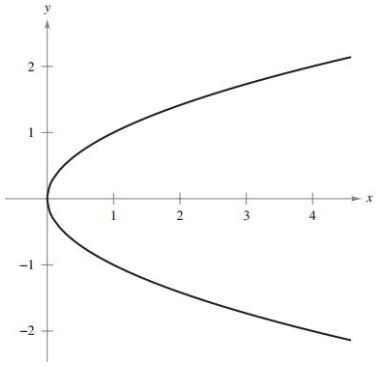
1. Find the domain and the range: $f(x) = -\sqrt{x+3}$

2. Determine the domain and range then evaluate the function at the indicated points.

$$f(x) = \begin{cases} x^2 + 2, & x \leq 1 \\ 2x^2 + 2, & x > 1 \end{cases}$$

a) $f(-2)$ b) $f(0)$ c) $f(1)$ d) $f(s^2 + 2)$

3. Use the vertical line test to determine if *y* is a function of *x*.




4. Find the composite functions $(f \circ g)$ and $(g \circ f)$. Give the domain for each.

$f(x) = \frac{1}{x}$

$g(x) = \sqrt{x+2}$

5. Determine **analytically** if the function is even, odd, or neither.

$f(x) = x^2(4 - x^2)$

6. Determine **analytically** if the function is even, odd, or neither.

$f(x) = x\cos x$

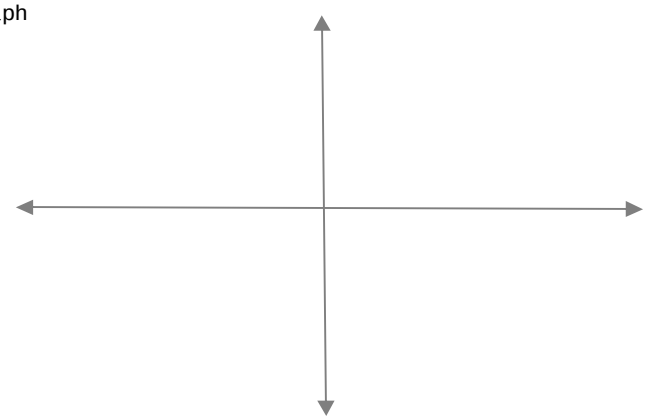
7. A graph goes through (4, 9). Give the coordinates of another point on the graph assuming the function is:
   a) even
   b) odd

**AP® Calculus BC**
**Summer Work #2**

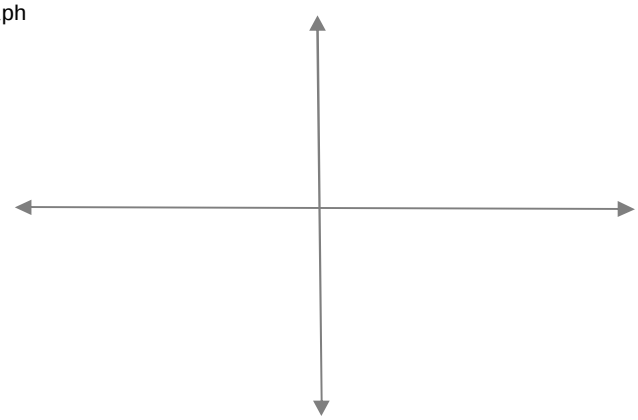
**Name:**_____
**Period:**_____

Analyze each function.

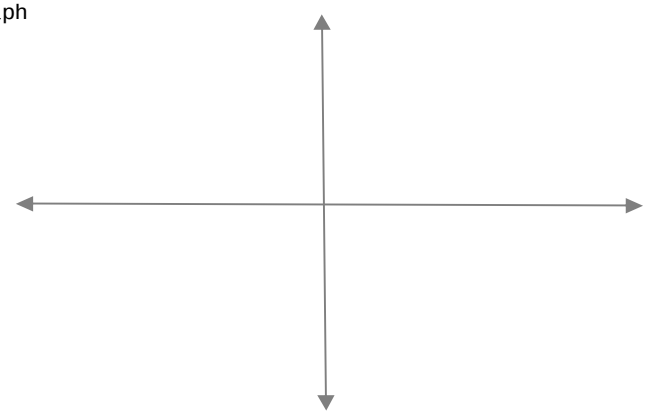
| $f(x) = k$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x\to-\infty} f(x)$ | $\lim_{x\to-\infty} f(x)$ |
| graph | |



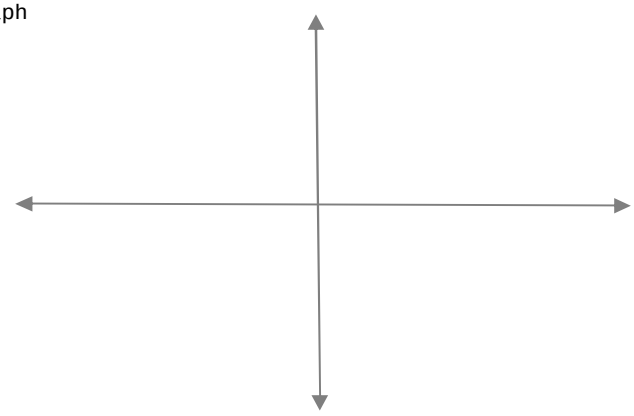
| $f(x) = x$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x\to-\infty} f(x)$ | $\lim_{x\to-\infty} f(x)$ |
| graph | |



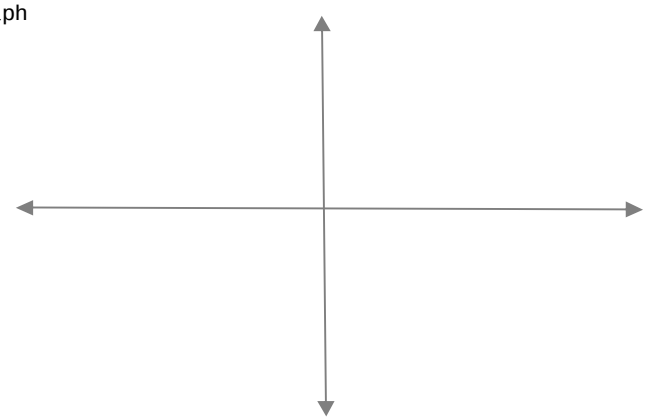
| $f(x) = x^2$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x\to-\infty} f(x)$ | $\lim_{x\to-\infty} f(x)$ |
| graph | |



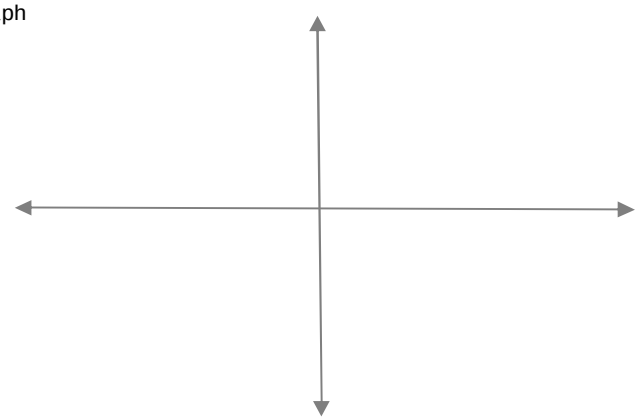
| $f(x) = x^3$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x\to-\infty} f(x)$ | $\lim_{x\to-\infty} f(x)$ |
| graph | |



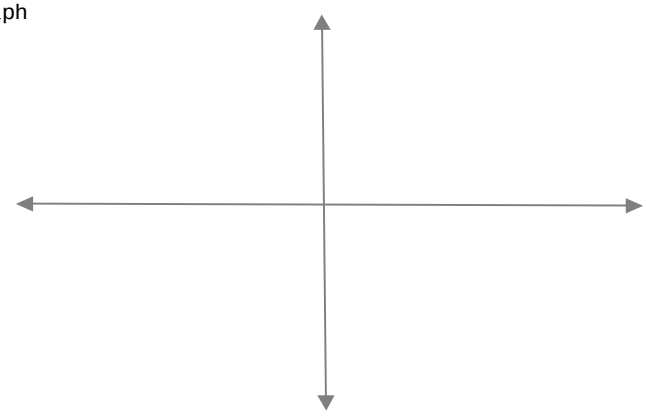
| $f(x) = \sqrt{x}$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



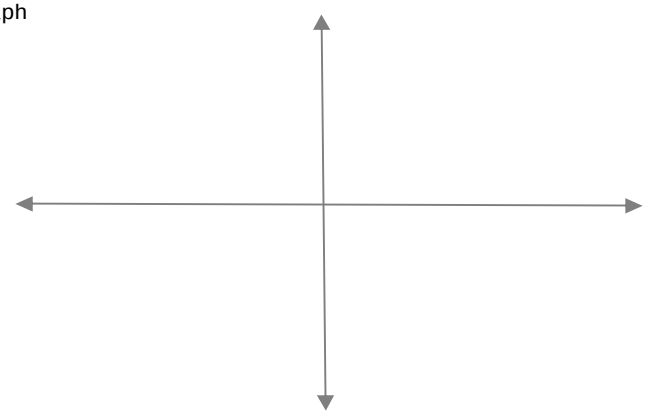
| $f(x) = \sqrt[3]{x}$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



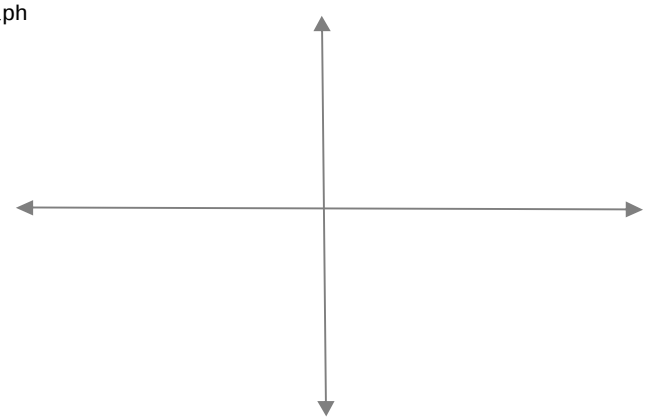
| $f(x) = \lvert x \rvert$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



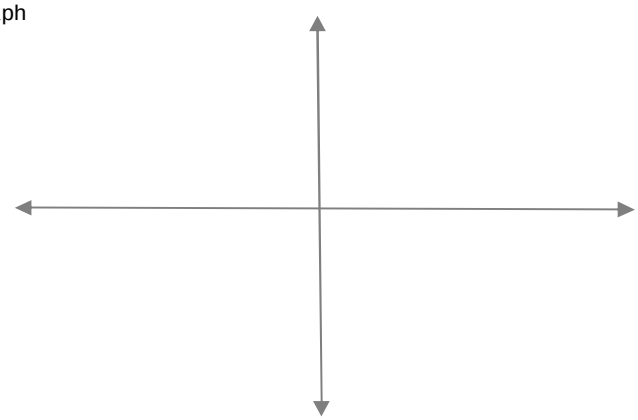
| $f(x) = [x]$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



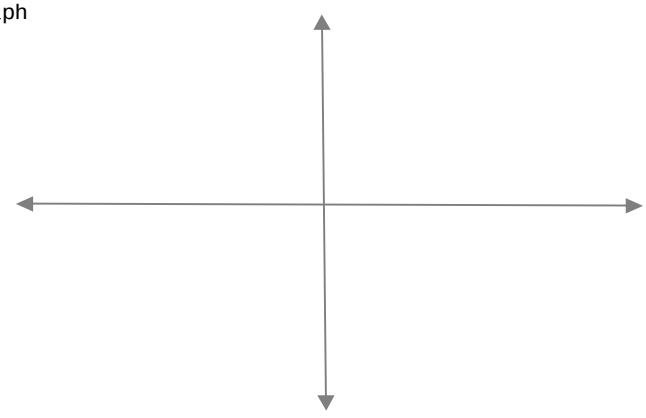
| $f(x) = \frac{1}{x}$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



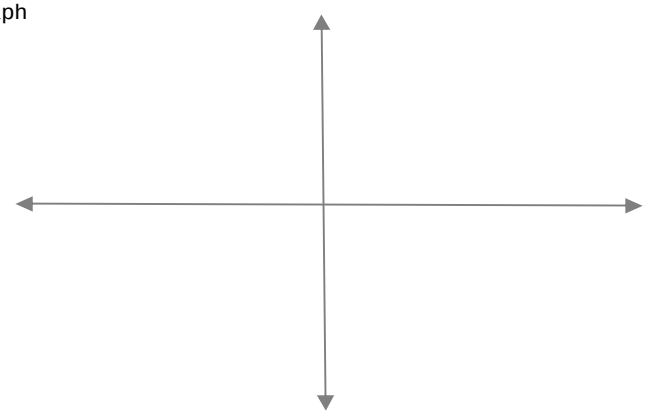
| $f(x) = \frac{1}{x^2}$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



| $f(x) = e^x$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



| $f(x) = \ln x$ | |
|---|---|
| domain | range |
| increasing | decreasing |
| maximum | minimum |
| $\lim_{x \to -\infty} f(x)$ | $\lim_{x \to -\infty} f(x)$ |
| graph | |



**AP® Calculus BC** **Name:**_____
**Summer Work #3** **Period:**_____

Given the graph of f(x), graph each of the requested transformations in a different color and label the colors.

1. On graph #1 (made up of 3 line segments) graph each of the requested transformations in a different color. Be sure to label each transformation with the color that you are using.

   a) f(x + 2) color:_____

   b) f(x) + 2 color:_____

   c) 2f(x) color:_____

   d) f(-x) color:_____

2. Repeat the same process on graph #2 (the line).

   a) f(x) - 3 color:_____

   b) f(x - 3) color:_____

   c) -3f(x) color:_____

   d) f(-3x) color:_____

3. Repeat the same process on graph #3 (two rays).

   a) f(x + 1) color:_____

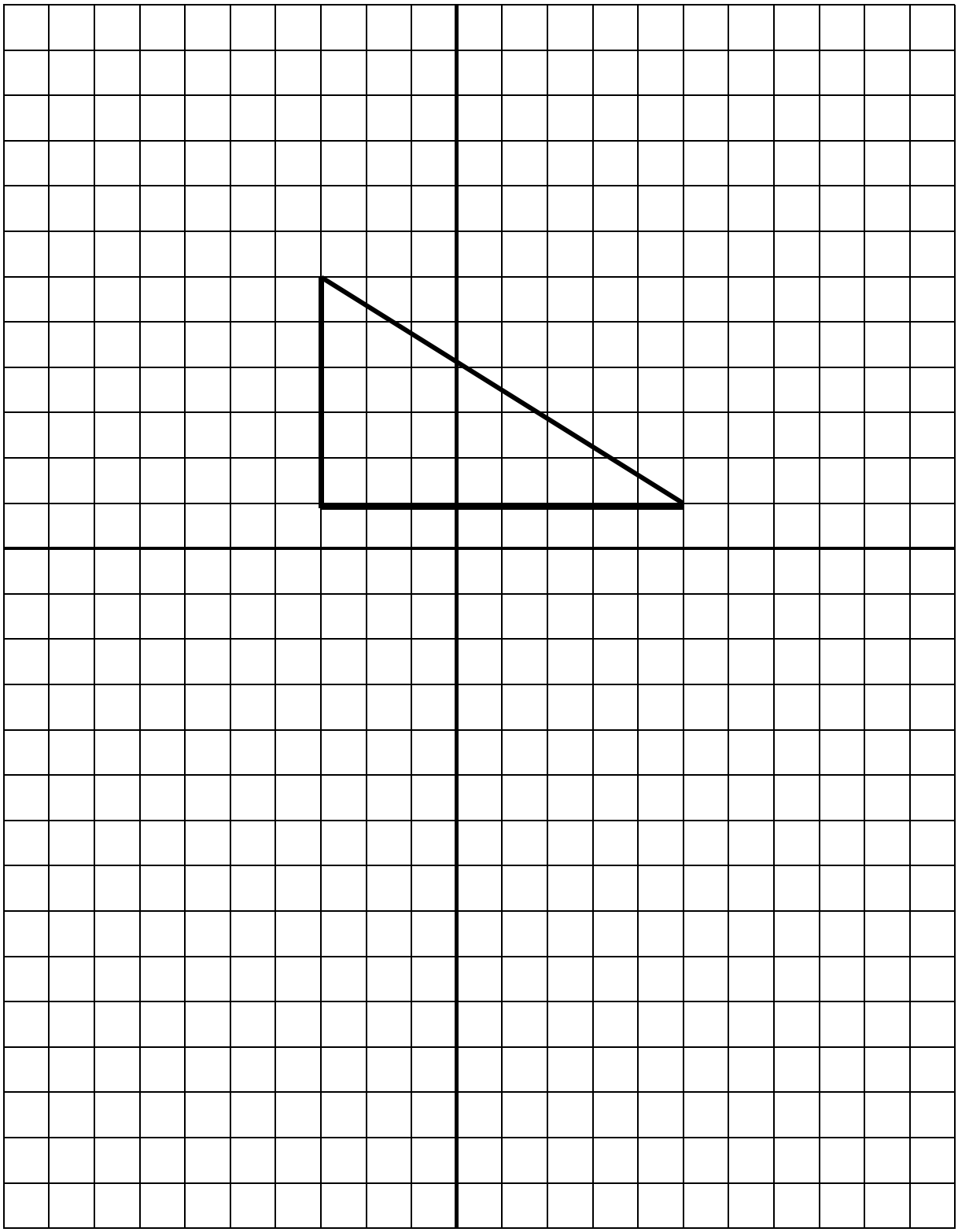
   b) f(x) - 1 color:_____

   c) f(4x) color:_____

   d) 4f(x) color:_____

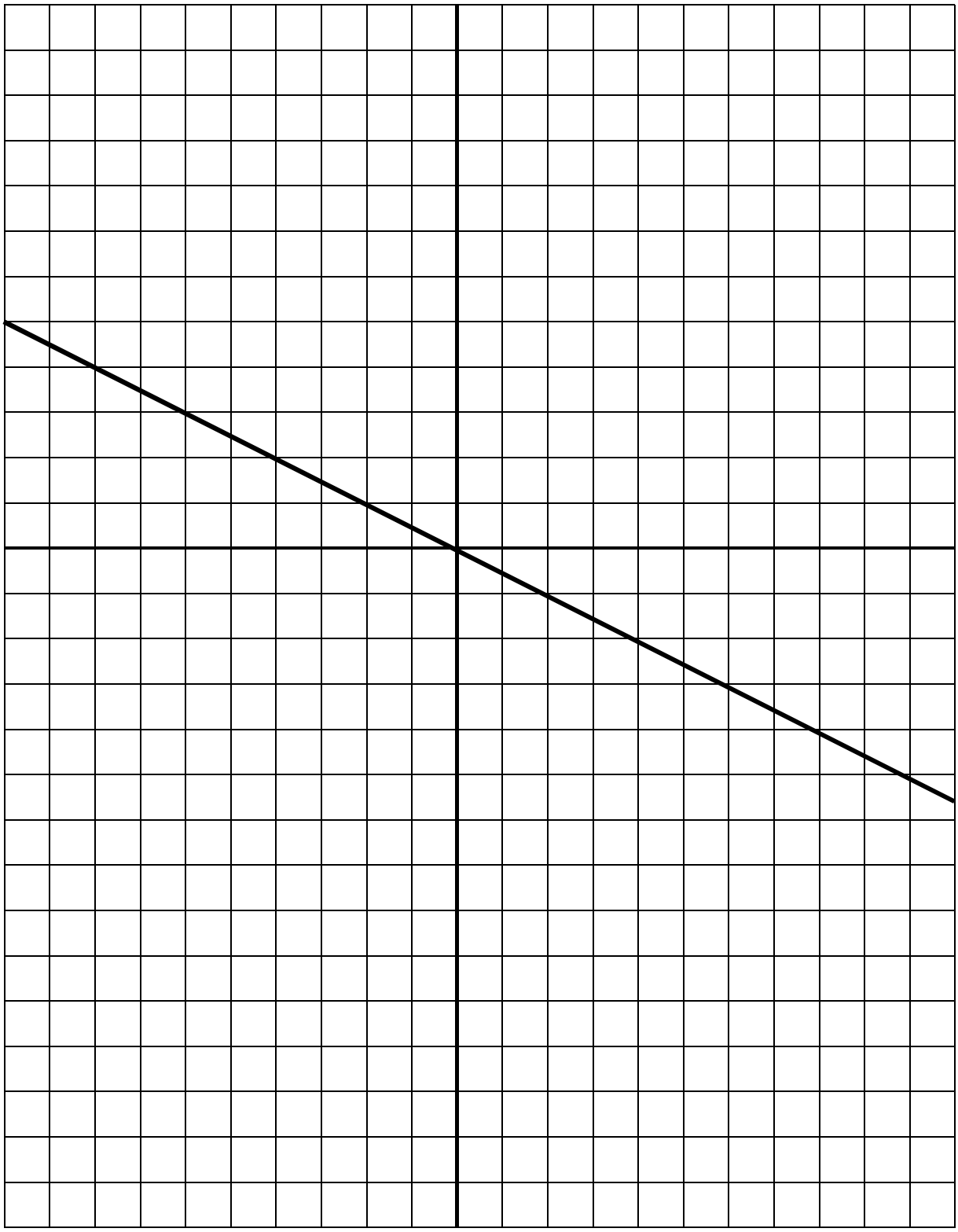
**AP® Calculus BC**
**Worksheet P.3.2**

**graph #1**



**AP® Calculus BC**
**Worksheet P.3.2**

**graph #2**



**AP® Calculus BC**
**Worksheet P.3.2**

**graph #3**