

Things every student should know about the AP* Calculus Exams (AB and BC)

This is an outline for the presenter. Students will have a copy of

1. Lin McMullin's "How, not only to survive, but to prevail..." that contains much of the same information.
2. Mark Howell's Exam Tips (two pages)
3. Students questions from released exams to illustrate the main points.
4. There is also a PowerPoint presentation on a few of the points.
5. [Questions in color](#) below are on the Student Question list.

1. Exam Format ([Use PPT sections on exam format](#))

See "How, not only to survive, but to prevail..." page 3.

Notice that you will only have your calculator for the first 30 minutes for the first 2 free response questions. If you see that you'll need to use the calculator during those 30 minutes, do it.

After 30 minutes you will put your calculator away and get the last 4 questions. You may work on all 6 questions now without your calculator.

2. Exam scoring ([Use PPT sections on exam scoring](#))

- a. Multiple-choice: Score = Number Correct (**NEW:** Blanks are not wrong. Students should answer ALL questions. Try to eliminate some answers before guessing.)
- b. Free-response standards: 6 questions @ 9 points each
- c. Cut points – you can leave some blanks and not answer some parts of a FR questions and still get a 5. This test is *not* scored like one of your teacher's exams.

3. Multiple-choice questions

- a. Guessing Score = Number Correct (**NEW:** Blanks are not wrong. Students should answer ALL questions. Try to eliminate some answers before guessing.)

- i. 2003 BC 14 slope field suitable for AB now – analyze by looking at sign of derivative in the 4 quadrants.
 - b. Answers (distracters) include predictable mistakes, but looking at the answers can sometimes prompt you on what to do.
 - i. Probably no “None of these” answers
 - ii. Look at the answers so you know how far to go – some questions ask just for the set-up. (2003 AB MC 11,)
 - iii. Can expect some I, II or III questions. There are essentially three true-false questions in one multiple choice.
 - iv. On the calculator active part, you need to decide when to pick up your calculator. One clue is that if you see a decimal point in the question or the answers, you might need it! (2003 AB 83, 84) But there are other questions best done with a calculator, that have whole number answers (2003 AB 81)
- 4. Free-response questions
 - a. What to expect
 - i. Try all questions, the questions are **not** arranged easiest to hardest
 - ii. “Type” questions (AB exam)
 - 1. Area-volume. Bet the bank there **will** be an area-volume question. There's been one on **every** AB exam (since 1969).
 - 2. Particle motion
 - 3. Interpretation of graphs – f , f' , f''
 - 4. Rates and Accumulation
 - 5. Differential Equations including slope fields
 - 6. Others – related rates, implicit differentiation, theory.
 - iii. Rule of Four Question

1. Tables – don't curve fit.
2. Given a graph work with it, don't try to write its equation.
3. Expect a question that requires reading and interpretation (2006 AB 2 "Thomasville" and other rate/accumulation questions)
4. Expect to write justifications. Be sure you know the proper way to justify a local max or min: "The function has a local max at $x = 2$ because its derivative changes sign from + to – at that point." Or "The function has a local max at $x = 5$ because $f'(5) = 0$ and $f''(5) < 0$." Similarly for points of inflection: "The graph of the function has a point of inflection at $x = 3$ because its second derivative changes sign at that point." Use 2005 AB4 here.

b. How to write a justification

- i. Key phrases that tell you when to justify answers: (Justify your answer, explain your reasoning, show the analysis that leads to your conclusion,) (2007 AB2/BC2 (b) and (c) candidates test and AB 3 (a) IVT, and (b) MVT)
- ii. Naming or quoting theorems – you may name the theorem or, if you can't be sure you mention how all the hypotheses are met by the function under consideration. (2005 AB3/BC3 (d))
- iii. Writing too much. Learn the key phrases as shown above and use them.

c. What to show and not show

- i. Simplifying. On the Free Response, no need to evaluate arithmetic or specific functions. DO substitute when evaluating an integral with the FTC.
- ii. "Three places past the decimal point."
- iii. Use standard notation

- iv. Integral = answer from calculator – No antiderivative necessary or desired.
Likewise $f'(3)$ = numerical answer from calculator – No symbolic derivative needed (2005 AB1 / BC 1 (a), (c))
 - v. Bald answers
 - vi. “Road mapping” gets no credit – don’t waste your time
 - vii. Cross out wrong answers with an X, but only **after** you've replaced the bad work with better work.
- d. Most common mistakes
- i. Rounding too soon (There was a question 2004 AB2 (b), when using 2 integrals, rounding, then subtracting gave the wrong answer.)
 - ii. Poor algebra.
5. For both MC and FR questions
- a. Theorems – IVT, MVT for derivatives and integrals, EVT,
 - b. Naming or quoting the theorems
 - c. Key words and tricky phrases (2007 AB 3 (a), (b)) “Explain why there must be a value c ... such that”
6. Calculator use (Use PPT section on calculator use)
- a. Before the exam
 - i. Fresh batteries
 - ii. Radians mode
 - b. The four minimal operations – skills you should know
 - i. Multiple-choice – Use your calculator any way you want
 - ii. Free-response – show set-ups and answer. Any calculator use other than “the 4” must be justified. No good to say, “There's a max there because I used the max button on my calculator.” Max not one of the 4.

- c. Hints
 - i. Store equations for reuse
 - ii. Store numbers you will reuse (limits of integration)
- d. Two things you should not do
 - i. Trace for intersections
 - ii. Area on the graph screen

7. General

- a. The exam emphasizes concepts over computations (but you still have to do computations)
 - i. If you find yourself doing a long page of computations you've probably made a mistake or at least missed the quick way. (2003 MC 1, 2, 4 straight forward no complicated computation)
- b. The night before the exam. Do a quick "once over" of the big ideas, and anything you think you might be weak on. But *get a good night's sleep!* Trying to cram now will probably do more harm than good.
- c. The morning of the exam eat a good breakfast. Give yourself plenty of time to get to the exam, remember your calculator and pencils. The exam is long; you need to be fresh. Warm up with a friend. Take a couple of derivatives...find a couple of antiderivatives...remind yourself that derivative and instantaneous rate of change and slope are all synonymous...remind yourself that the integral of the rate of change of "stuff" tells you the net change in the "stuff"... Write the equation of a line.
- d. Think positively. You CAN do well; you've worked hard to learn calculus. Do your very best; you only get to do this once!