

# AP Calculus Test Hints

## Multiple Choice:

- 1) The multiple choice is divided into two parts. Part A has 28 questions which must be answered without a calculator. The time for Part A is 55 minutes. Part B has 17 questions to be answered using a graphing calculator. (Only 5 or 6 of these actually require the use of the calculator.) The time for Part B is 50 minutes.
- 2) Only guess if the odds are in your favor, i.e. you can eliminate 2 or 3 of the answers.
- 3) Don't change a multiple choice answer unless you find an error in your calculations.

## Calculators:

- 1) Each student is permitted to bring two graphing calculators to the exam. Non-graphing scientific calculators are NOT permitted.
- 2) Things you are expected to be able to do with the calculator:
  - A) Produce the graph of a function within an arbitrary viewing window.
  - B) Find the zeros of a function (Solve equations numerically).
  - C) Compute the derivative of a function numerically.
  - D) Compute definite integrals numerically.
- 3) For solutions obtained using one of the 4 calculator functions in #2, students are only required to write the setup (an equation, derivative, or definite integral that leads to the solution) along with the result produced by the calculator.
- 4) For solutions obtained using a calculator capability other than the 4 stated in #2, students must show the mathematical steps that lead to the answer; a calculator result is NOT sufficient. For example, if the student is asked to find a relative minimum value of a function, the student is expected to use calculus and show the mathematical steps leading to the answer. It is NOT acceptable to graph the function or use a built-in minimum finder.

## Scoring:

$$\begin{aligned} \text{Part I (MC)} & \quad (\# \text{ correct})(1.2) - (\# \text{ wrong})(.25) = \text{possible } 54 \\ \text{Part II (FRQ)} & \quad (6 \text{ questions})(9 \text{ points each}) = \underline{\text{possible } 54} \\ & \quad \text{Total possible} = 108 \end{aligned}$$

### Free Response:

- 1) The directions for this section are attached at the end of this handout. Be sure to read them carefully, so that you are familiar with them before the day of the test.
- 2) Don't necessarily start at problem #1. Look through them all first and start where you feel the most comfortable.
- 3) Remember, sometimes you can do parts b and c in a problem, even though you cannot do part a.
- 4) Don't tell them how to do a problem – DO IT! If you do not know how to do the problem, move on to one you can do. You get no credit for saying things like, "I know I should take the integral and then I should evaluate it at  $x = 2$ , and then ..."
- 5) Show all your work. If you change your mind, CROSS IT OUT – DO NOT ERASE! You may receive some credit if the crossed out answer was correct.
- 6) Do not do excessive writing. If they ask when an object is moving to the right, do not also tell them when it is moving to the left. Do not waste time telling why unless they ask you to justify. If you do need to justify, use symbolic statements such as " $v > 0$ " rather than writing " $v$  is positive."
- 7) Make sure that you answer the question. Do they want the  $x$ -coordinate of the point where the maximum exists? Or, do they want the actual maximum value ( $y$ -value)?
- 8) When justifying where a function is increasing, go beyond the number line justification. Although you may use the number line (be sure to label it as  $f'$  or  $f''$  in the case of concavity), conclude by saying "the function is increasing on  $-1 < x < 2$  because  $f'(x) > 0$  on that interval."
- 9) If when finding an area between 2 curves you accidentally subtract backwards, go back and put absolute values on everything and you will recoup your point.
- 10) Average value has become a popular application. The growth and decay formula  $y = y_0 e^{kt}$  also appears regularly.
- 11)  $\int \ln x = x \ln x - x + C$  appears frequently. The only inverse trig integrals you might need are the ones leading to arcsin or arctan. These two inverse trig functions are also the only two you might have to differentiate. In addition, when integrating, the only trig substitutions you may need would be identities for  $\cos^2 x$  or  $\sin^2 x$ .
- 12) Trig functions, logarithmic functions, and exponential functions must be simplified. Expressions such as  $5x + 3x$  or  $\frac{30}{15 - 21}$  are acceptable. If you simplify incorrectly, it will reduce your score. QUIT WHILE YOU ARE AHEAD!!!
- 13) If you use decimal approximations, they should be correct to three places after the decimal point. Also, clearly use a symbol indication that you now have an approximation. ( $\approx$ )
- 14) Work must be expressed in standard mathematical notation rather than calculator syntax. (Statements such as  $\text{fnInt}(x^2, x, 1, 5)$  are unacceptable)
- 15) About 40% of the test is on BC topics only. The other 60% includes AB topics.
- 16) When giving intervals of increasing, decreasing, or concavity, do NOT include the endpoints. Relative maxima or minima only occur when the derivative is 0 or fails to exist. If they ask for an absolute maximum or minimum, then you must take any endpoints of the domain into consideration.
- 17) Graphs alone are **never** a justification for anything!!!
- 18) When taking an improper integral, if you do not write the word **lim** you will lose a point. Ex:  
$$\int_0^{\infty} x dx = \frac{x^2}{2} \Big|_0^{\infty} \text{ is unacceptable. } \int_0^{\infty} x dx = \lim_{b \rightarrow \infty} \frac{x^2}{2} \Big|_0^b \text{ is correct.}$$
- 19) The following topics were added to the BC syllabus in 1998: Slope Fields, Euler's Method, and Logistic Differential Equations. They will probably appear with great frequency (HINT!! HINT!!) Logarithmic differentiation was also removed from the syllabus.