Review Highlights

Series

A. P. Calculus Exam Tips

1) Bring PENCILS - cross out big mistakes don't erase, takes too long

2) Multiple Choice - don't guess randomly - $\frac{1}{4}$ point penalty for wrong answers

3) "Justify Answer" - explain and/or show how you got your answer for full credit

4) Free-Response - must set up in proper mathematical notation - not just GC notation. e.g. (integral was here) not just fnint (sin2(3x),x,0,pi).

5) If not required to "justify answer", you may set up in proper notation and THEN enter into GC. All "final answers" must be correct to 3 decimal places

6) Free-Response- even if you don't think a particular step is right, you can get later points if you use your answer correctly for another part. TRY IT! Every point counts!

7) If you have no clue on a MC question, LEAVE it. Do the ones you know how to handle and then go back and fill in the gaps. Remember, guess sparingly.

8) Use time wisely! It is not uncommon to not finish all questions. Don't spend more than about 2-3 minutes on any MC question the first time through, or about 15 minutes on a FR question

9) Get a good night's rest the night before the exam. It won't help you to stay up half the night studying and fall asleep during the exam or be so tired that you can't think straight!

10) Take an extra grapher or batteries. May take a max of two graphers to exam.

11) Stay calm and keep a cool head. If you get flustered stop and take a few deep breaths and move on. YOU KNOW THIS STUFF!

12) AND MOST IMPORTANTLY: Good luck and HAVE FUN!

From College Board

Show all work.
Remember that the grader is not really interested in finding out the answer to the problem. The grader is interested in seeing if you know how to solve the problem.

Do not round partial answers.
Store them in your calculator so that you can use them unrounded in further calculations.

Do not let the points at the beginning keep you from getting the points at the end.
If you can do part (c) without doing (a) and (b), do it. If you need to import an answer from part (a), make a credible attempt at part (a) so that you can import the (possibly wrong) answer and get your part (c) points.

From College Board

If you use your calculator to solve an equation, write the equation first.
An answer without an equation might not get full credit, even if it is correct.

If you use your calculator to find a definite integral, write the integral first.
An answer without an integral will not get full credit, even if it is correct.

Do not waste time erasing bad solutions.
If you change your mind, simply cross out the bad solution after you have written the good one. *Crossed-out work will not be graded*. If you have no better solution, leave the old one there. It might be worth a point or two.

From College Board

<u>**Do not use your calculator for anything except**</u>:
(a) *graph functions*, (b) *compute numerical derivatives*, (c) *compute definite integrals*, and (d) *solve equations*. In particular, do not use it to determine max/min points, concavity, inflection points, increasing/decreasing, domain, and range. (You can explore all these with your calculator, but your solution must stand alone.)

<u>**Be sure you have answered the problem.**</u>
For example, if it asks for the maximum value of a function, do not stop after finding the x at which the maximum value occurs. Be sure to express your answer in correct units if units are given.

From College Board

If you can eliminate some incorrect answers in the multiple-choice section, it is advantageous to guess.
Otherwise it is not. Wrong answers can often be eliminated by estimation, or by thinking graphically.

If they ask you to justify your answer, think about what needs justification.
They are asking you to say more. If you can figure out why, your chances are better of telling them what they want to hear. For example, if they ask you to justify a point of inflection, they are looking to see if you realize that a sign change of the second derivative must occur.

On sign charts

Let f be the function given by $f(x) = 2\ln(x^2 + 3) - x$ with domain $-3 \le x \le 5$. Find the x-coordinate of each relative maximum point and each relative minimum point of f. Justify your answer.

Solution

$$f'(x) = 2 \cdot \frac{2x}{x^2 + 3} - 1 = -\frac{(x-3)(x-1)}{x^2 + 3}.$$

f'	$-$	$+$	$-$
f	dec	inc	dec

$\qquad -3 \qquad\quad 1 \qquad\quad 3 \qquad\quad 5$

There is a relative minimum at $x = 1$
There is a relative maximum at $x = 3$

Does not earn Justification point

A sign chart is useful and is recommended as an investigative tool,
But a sign chart will not earn justification points.

On sign charts

Let f be the function given by $f(x) = 2\ln(x^2 + 3) - x$ with domain $-3 \le x \le 5$. Find the x-coordinate of each relative maximum point and each relative minimum point of f. Justify your answer.
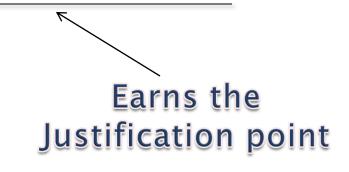
Solution

$$f'(x) = 2 \cdot \frac{2x}{x^2 + 3} - 1 = -\frac{(x-3)(x-1)}{x^2 + 3}.$$

f'	$-$	$+$	$-$
f	dec	inc	dec

$-3 \qquad 1 \qquad 3 \qquad 5$

There is a relative minimum at $x = 1$ because f' changes from negative to positive.
There is a relative maximum at $x = 3$ because f' changes from positive to negative.

Earns the
Justification point

Top 10 Mistakes

1. $f''\ x\ = 0 \qquad \Longleftrightarrow \qquad x, f\ x$ is point of inflection.

2. $f\ x$ is a maximum(minimum) $\Longleftrightarrow f'\ x\ = 0$

3.   Average rate of change on a, b is $\dfrac{f'\ a\ + f'\ b}{2}$

4.   Volume by washers is $\pi \displaystyle\int_{a}^{b} R - r^{2}\, dx$

5.   Separable differential equations can be solved without separating the variables

Top 10 Mistakes

6.   Omitting the constant of integration $+c$

7.   Graders will assume the correct antecedents for pronouns used in justifications

8.   If the correct answer is present then your setup must have been correct

9.   Universal logarithmic differention

$$\int \frac{1}{f\ x}\, dx = \ln\left| f\ x \right| + c$$

10. $\dfrac{d}{dx} f\ y = f'\ y$ and other chain rule errors

Other tips

- Hesitate if computations get extremely complicated
- Read each of the Free Response questions and do them in the order that works for you
- Show all your work!!!
- Be sure to answer the question that was asked
- Be complete, but concise, in your explanations
- Work needs to be orderly and progress down and to the right
- Write neatly – they can't grade what they can't read or understand
- Clearly mark your answer
- Write complete integral statements
- Exact answers or 3-decimal accuracy, unless otherwise stated
- Give Calculus explanations, not Precalculus or "common sense"
- When referencing a theorem, clearly show that the conditions of the theorem have been met