



Part 1 – Calculator Active Exam Tips

The AP* Calculus exam is long. It is a marathon of the mind. Success requires training.

Tip #1 – Know the course

There is a free-response (FR) section and multiple-choice (MC) section. For both there is a 'calculator NOT allowed' section and a 'graphing calculator is required' section.

On the two FR sections you have a total 1 hour and 30 minutes to do 6 questions, 2 with your TI-Nspire CAS handheld and 4 without. In Section 1 Part A, you will have 55 minutes to complete 28 MC questions where a calculator is NOT allowed. Section 1 Part B requires a calculator to complete 17 MC questions in 50 minutes.

1. About how much time should you spend on each question in each part of the exam?

Tip #2 – Know the expectations

On the calculator active questions you should:

- Give answers to 3 decimal places (unless it says otherwise, e.g., give answer to the nearest cent).
 - Be able to do the following four things:
 - graph on an arbitrary window
 - solve equations (find zeros & intersection points)
 - numerically calculate the derivative
 - numerically calculate the definite integral
2. The position function of a particle is $s(t) = 3t + 6.5\sin(2t)$. What is $v(2)$?

On a *Calculator* page, enter $\frac{d}{dt}(3t+6.5\sin(2t))|t=2$. A shortcut for the derivative template is

. The “such that” bar after the derivative command is found by pressing .

You should be in radian mode for most calculations. To change the angle mode, press and go to **Settings and Status > Settings > General**. Pay attention to the mode to make sure it is appropriate for each problem.

Using AUTO mode is also nice. You get an exact answer if possible, or if there is a decimal in what you enter, you get a decimal answer. Pressing + (\approx) will give an approximation.

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Tip #3 – Have the right gear

Besides the right settings, bring a couple of pencils. You can actually bring 2 graphing calculators. Be sure they have reasonably fresh batteries.

3. $h(x) = \int_0^x (t \cos(t^3) - 0.7) dt$. Where is $h(x)$ increasing between $-1.8 < x < 1.4$?

Find the solution graphically. Press $\left(\frac{\text{=}}{\text{graph}}\right)$ once or twice, opening Scratchpad, until you see a graph screen. (Scratchpad is a quick way to perform a calculation or create a graph. It does not carry variables over from the document.) First change the window to view only the domain by selecting **MENU > Window/Zoom > Window Settings: XMin: -1.8, XMax: 1.4**. Graph the derivative. Why? What are you looking for?

Find the zeros using the **Graph Trace** feature. Select **MENU > Trace > Graph Trace**. You can enter a value to get to where you want to go faster.

Try using CAS with a limited domain. Press $\left(\frac{\text{=}}{\text{calc}}\right)$ once or twice until you see a calculator screen. Then **MENU > Algebra > Solve**. If you have already entered the function in $f1(x)$, enter **solve(f1(x)=0,x)|-1.8<x<1.4**.

The 'such that' symbol needs to be outside of the parentheses.

4. Find the area of the region bounded by $y = \frac{1}{x}$, $y = 3\ln(x)$, and the vertical line $x = 3$.

A shortcut for the integral template is $\left(\frac{\text{=}}{\text{int}}\right)$. One way to find the intersection point on a *Graph* page is to select **MENU > Points & Lines > Intersections Point(s)**. Then click the two things you want to find the intersection of. To store a value, like the x-coordinate of the point of intersection, you can click on the value and press $\left(\text{ctrl}\right) + \left(\text{var}\right)$, or you can use the context dependent menu found by right-clicking $\left(\text{ctrl}\right) + \left(\text{menu}\right)$. When you hover over a value and press $\left(\text{ctrl}\right) + \left(\text{menu}\right)$ you'll see **Store**. Store the x-coordinate as xc . Then, use xc in the limits of integration. By doing this, you won't make a rounding error and you won't make a mistake in typing the numbers incorrectly. Next, insert a *Calculator* page and solve the integral.

Part 2 – AB Exam Practice Non-Calculator Type Questions

Answer the following AP-type exam questions. These are similar to non-calculator questions you will encounter on the exam. You should spend on average less than 2 minutes for each question. Don't spend too much time on any one question. On the actual exam, you will have plenty of space so extra paper will not be needed. However, for this practice you may need additional space.

1. If $y = (4x^2 + 5)^3$, then $\frac{dy}{dx} =$

(A) $12(8x)^2$

(B) $4x(4x^2 + 5)^3$

(C) $8x(4x^2 + 5)^2$

(D) $24x(4x^2 + 5)^2$

(E) $12x(4x^2 + 5)^2$

2. $\int_0^3 \left(\frac{1}{3} e^{-\frac{x}{3}} \right) dx$

(A) $\frac{1}{9}(1 - e^{-1})$

(B) $e^{-1} - 1$

(C) e^{-1}

(D) $\frac{1}{3}(1 - e^{-1})$

(E) $1 - e^{-1}$

3. If $\tan(x) = e^y$, what is $\frac{dy}{dx}$?

(A) $\frac{\sec(x)}{\tan(x)}$

(B) $\frac{1}{\sin(x)\cos(x)}$

(C) $\frac{\cos(x)}{\sin(x)}$

(D) $\ln(\tan(x))$

(E) $\tan(x)\sec^2(x)$

4. If $y = \frac{5x+7}{2x+3}$, then $\frac{dy}{dx} =$

(A) $\frac{-10x-14}{(2x+3)^2}$

(B) $\frac{29}{(2x+3)^2}$

(C) $\frac{1}{(2x+3)^2}$

(D) $\frac{22}{(2x+3)^2}$

(E) $\frac{5}{2}$

5. $\int_0^{\pi/6} (2 \cos x) dx$

- (A) $\sqrt{3}$ (B) $\sqrt{3} - 2$ (C) -1.5
 (D) 1 (E) $\frac{\sqrt{3}}{2}$

6. $\lim_{x \rightarrow \infty} \left(\frac{4x^2 - 5x - 3}{3x^2 + 2x + 4} \right)$

- (A) $-\frac{4}{9}$ (B) $-\frac{3}{4}$ (C) 1
 (D) $\frac{4}{3}$ (E) ∞

7. If $f(x) = 1 + 3g(x)$ when $2 \leq x \leq 7$, find $\int_2^7 (f(x) - g(x)) dx$.

- (A) $4 \int_2^7 (g(x)) dx$ (B) $x + 2 \int_2^7 (g(x)) dx$ (C) $5 + 2 \int_2^7 (g(x)) dx$
 (D) $-\int_2^7 (1 + 3g(x)) dx$ (E) $-10 - 2 \int_2^7 (g(x)) dx$

8. If $y = \sqrt{2x} \cdot \tan(3x)$, then $\frac{dy}{dx} =$

- (A) $\frac{1}{2}(2x)^{-\frac{1}{2}} \sec^2(3x)$
 (B) $3(2x)^{-\frac{1}{2}} \sec^2(3x)$
 (C) $\sqrt{2x} \sec^2(3x) + \frac{1}{2}(2x)^{-\frac{1}{2}} \tan(3x)$
 (D) $3\sqrt{2x} \sec^2(3x) + (2x)^{-\frac{1}{2}} \tan(3x)$
 (E) $\sqrt{2x} \sec^2(3x) + (2x)^{-\frac{3}{2}} \tan(3x)$

9. Find the equation of the tangent line to $y = \sin(2x)$ at the point $(\pi, 0)$.

- (A) $y = 2x - 2\pi$ (B) $y = -2x + 2\pi$ (C) $y = 2x$
 (D) $y = x - \pi$ (E) $y = x - 2\pi$