

AP<sup>®</sup>

 CollegeBoard

# 2020 Exam Sample Questions

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AP<sup>®</sup> CALCULUS BC

## 2020 Exam SAMPLE Question 1

(Adapted from: 2019 AP<sup>®</sup> Calculus BC Exam Questions)

**General Notes:** The questions you will see on the 2020 AP Calculus Exam are similar to questions you might have seen on items used on past AP Calculus Exams. The practice item below is constructed from items from the 2019 AP Calculus BC Exam, with minor modifications:

- Question 1, below, combines elements from more than one question from the 2019 exam so that you can practice working on a 25-minute question.
- Certain parts of 2019 questions were modified from the original to make them calculator neutral.
- Other parts might have been omitted, because the assessed content was taken from an excluded unit or topic.

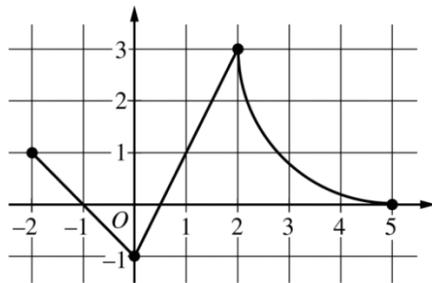
Whether you decide to keyboard or handwrite your responses, be careful to communicate clearly:

- Begin by labeling the part of the question you are working on.
- Be careful to use parentheses correctly.
- Leave numeric answers in unsimplified form.
- Be sure to upload your response before the clock counts all the way down.

**Directions:** The use of a graphing calculator is permitted. A calculator is not required to answer any parts of the question. Show all of your work, even though the question may not explicitly remind you to do so. Clearly label any functions, graphs, tables, or other objects that you use. Justifications require that you give mathematical reasons, and that you verify the needed conditions under which relevant theorems, properties, definitions, or tests are applied. Your work will be scored on the correctness and completeness of your methods as well as your answers. Answers without supporting work will usually not receive credit. Unless otherwise specified, answers (numeric or algebraic) need not be simplified. If your answer is given as a decimal approximation, it should be correct to three places after the decimal point. Unless otherwise specified, the domain of a function  $f$  is assumed to be the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## Sample Question 1

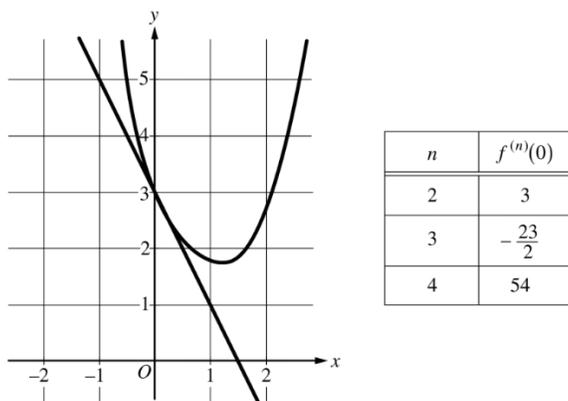
Allotted time: 25 minutes (plus 5 minutes to submit)



Graph of  $f$

The continuous function  $f$  is defined on the closed interval  $-6 \leq x \leq 5$ . The figure above shows a portion of the graph of  $f$ , consisting of two line segments and a quarter of a circle centered at the point  $(5, 3)$ . It is known that the point  $(3, 3 - \sqrt{5})$  is on the graph of  $f$ .

- (a) If  $\int_{-6}^5 f(x) dx = 7$ , find the value of  $\int_{-6}^{-2} f(x) dx$ . Show the work that leads to your answer.
- (b) Evaluate  $\int_3^5 (2f'(x) + 4) dx$ .
- (c) The function  $g$  is given by  $g(x) = \int_{-2}^x f(t) dt$ . Find the absolute maximum value of  $g$  on the interval  $-2 \leq x \leq 5$ . Justify your answer.
- (d) Find  $\lim_{x \rightarrow 1} \frac{10^x - 3f'(x)}{f(x) - \arctan x}$ .



A function  $f$  has derivatives of all orders for all real numbers  $x$ . A portion of the graph of  $f$  is shown above, along with the line tangent to the graph of  $f$  at  $x = 0$ . Selected derivatives of  $f$  at  $x = 0$  are given in the table above.

- (e) Write the third-degree Taylor polynomial for  $f$  about  $x = 0$
- (f) Let  $h$  be the function defined by  $h(x) = \int_0^x f(t) dt$ . Use the Taylor polynomial found in part (e) to find an approximation for  $h(1)$ .
- (g) Evaluate  $\int_1^{\infty} \frac{1}{x^{p+1}} dx$ , where  $p > 0$ .

## Notes on 2020 Exam Question 2

The time allotted for 2020 Question 2 is 15 minutes (plus 5 minutes to submit). Most FRQs on traditional year AP Calculus BC Exams are designed to take approximately that much time.

Additional suitable practice questions from the 2019 AP Calculus BC Exam :

- You are encouraged to practice both FRQ 4 and FRQ 5
- The content in FRQ 1 might be assessed on the 2020 exam, but the question would need to be modified to be calculator neutral.