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2018 ap calculus ab free response question 3

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If you score high enough on the exam, your AP Calculus score could earn you college credit! Check out our AP Calculus AB Guide for the essential information you need for the exam: What's on the AP Calculus AB Exam? The College Board is very detailed in what they require your AP teacher to cover in his or her AP Calculus AB course. You should be familiar with the following topics: Functions, Graphs, and Limits: Analysis of Graphs, Limits, Asymptotes, Continuity Differential Calculus: The definition of the Derivative, Derivative at a Point, Derivative of a Function, Second Derivative, Applications of Derivatives, Computation of Derivatives Integral Calculus: Riemann Sums, Applications of Integrals, Fundamental Theorem of Calculus, Techniques of Antidifferentiation, Applications of Antidifferentiation Read More: Review for the exam with our AP Calculus AB Cram Course AP Calculus AB vs. BC AP Calculus is divided into two classes: AB and BC. The College Board says Calculus AB is the equivalent of a semester of college calculus and BC is the equivalent of a year of college calculus. In truth, AB calculus covers closer to three quarters of a year of college calculus. The main difference between the two is that BC Calculus tests some more theoretical aspects of calculus, and it covers a few additional topics. Check out our line of AP guides for a comprehensive content review. AP Calculus AB Sections and Question Types The AP Calculus AB exam is three hours long and has two sections: a multiple-choice section and a free-response section. Each exam section has a Part A and a Part B. Section Timing Number of Questions % of Exam Score Section 1 Part A: 60 minutes Part B: 45 minutes Part A: 30 multiple choice questions Calculator not permitted Part B: 15 multiple choice questions Calculator permitted 50% Section 2 Part A: 30 minutes Part B: 60 minutes Part A: 2 free response questions Calculator permitted Part B: 4 free response questions Calculator not permitted 50% Read More: QUIZ: Test your knowledge with an AP Calculus AB pop quiz! Multiple Choice The multiple-choice questions on the AP Calculus AB exam cover a variety of calculus topics and are discrete, as opposed to appearing in question sets, and will have a similar format that is followed by five answer choices. At times, it may seem that there could be more than one possible correct answer. Answers resulting from common mistakes are often included in the five answer choices to trap you. Free Response Questions The FRQ section of the AP Calculus AB exam consists of six questions that require you to write out the solutions and steps by which you solved it. Partial credit is given for various steps in the solution of each problem. You'll usually be required to sketch a graph in one of the questions. AP Calculus AB Scores AP scores are reported from 1 to 5. Colleges are generally looking for a 4 or 5 on the AP Calculus AB exam, but some may grant credit for a 3. Learn more about college AP credit policies. Each test is curved so scores vary from year to year. Here's how AP Calculus AB students scored on the May 2017 test: Score Meaning Percentage of Test Takers 5 Extremely qualified 18.7% 4 Well qualified 18% 3 Qualified 20.8% 2 Possibly qualified 22% 1 No recommendation 20.4% Source: College Board How can I prepare? AP classes are great, but for many students they're not enough! For a thorough review of AP Calculus AB content and strategy, pick the AP prep option that works best for your goals and learning style. For more than 35 years, students and families have trusted The Princeton Review to help them get into their dream schools. We help students succeed in high school and beyond by giving them resources for better grades, better test scores, and stronger college applications. Follow us on Twitter: @ThePrincetonRev. Questions and Worked Solutions for AP Calculus AB 2018. Related Topics: More videos, activities and worksheets that are suitable for Calculus AP Calculus AB 2018 Free Response Questions - Complete Paper (pdf) AP Calculus AB 2018 Free Response Question 1 Rate in/rate out problem. You can use a calculator. Find total entering. Use an accumulation function and the Fundamental Theorem of Calculus (FTC). Finding the absolute minimum on a closed interval. 1. People enter a line for an escalator at a rate modeled by the function r given by where $r(t)$ is measured in people per second and t is measured in seconds. As people get on the escalator, they exit the line at a constant rate of 0.7 person per second. There are 20 people in line at time $t = 0$. (a) How many people enter the line for the escalator during the time interval $0 \leq t \leq 300$? (b) During the time interval $0 \leq t \leq 300$, there are always people in line for the escalator. How many people are in line at time $t = 300$? (c) For $t > 300$, what is the first time t that there are no people in line for the escalator? (d) For $0 \leq t \leq 300$, at what time t is the number of people in line a minimum? To the nearest whole number, find the number of people in line at this time. Justify your answer. Show Step-by-step Solutions AP Calculus AB 2018 Free Response Question 2 Particle motion along the x-axis problem. Given velocity. Find derivative at a point, acceleration, using calculator. Find position using the FTC (Fundamental Theorem of Calculus). Distinguish between displacement and distance traveled. Find when velocity is equal to that of a second particle. 2. A particle moves along the x-axis with velocity given by for time $0 \leq t \leq 3.5$. The particle is at position $x = -5$ at time $t = 0$. (a) Find the acceleration of the particle at time $t = 3$. (b) Find the position of the particle at time $t = 3$. (c) Evaluate and evaluate. Interpret the meaning of each integral in the context of the problem. (d) A second particle moves along the x-axis with position given by $x_2(t) = t^2 - t$ for $0 \leq t \leq 3.5$. At what time t are the two particles moving with the same velocity? Show Step-by-step Solutions AP Calculus AB 2018 Free Response Question 3 Reasoning from a graph. Using the FTC and a graph geometrically. Using the FTC and a function. Finding an antiderivative. Using the first derivative to find where a function is increasing and concave up. Finding and justifying points of inflection. 3. The graph of the continuous function g , the derivative f , is shown above. The function g is piecewise linear for $-5 \leq x \leq 3$, and $g(x) = 2(x - 4)^2$ for $3 \leq x \leq 6$. (a) If $f(1) = 3$, what is the value of $f(-5)$? (b) Evaluate (c) For $-5 < x < 6$, on what open intervals, if any, is the graph of f both increasing and concave up? Give a reason for your answer. (d) Find the x-coordinate of each point of inflection of the graph of f . Give a reason for your answer. Show Step-by-step Solutions AP Calculus AB 2018 Free Response Question 4 Reasoning from a table. Approximating a derivative at a point. Using MVT (Mean Value Theorem) to guarantee a value. Trapezoidal Rule to approximate average value. Related rates problem using a new function 4. The height of a tree at time t is given by a twice-differentiable function H , where $H(t)$ is measured in meters and t is measured in years. Selected values of $H(t)$ are given in the table above. (a) Use the data in the table to estimate $H'(6)$. Using correct units, interpret the meaning of $H'(6)$ in the context of the problem. (b) Explain why there must be at least one time t , for $2 < t < 10$, such that $H'(t) = 2$. (c) Use a trapezoidal sum with the four subintervals indicated by the data in the table to approximate the average height of the tree over the time interval $2 \leq t \leq 10$. (d) The height of the tree, in meters, can also be modeled by the function G , given by $G(x) = \frac{1}{2}x^2 + \frac{1}{4}x$, where x is the diameter of the base of the tree, in meters. When the tree is 50 meters tall, the diameter of the base of the tree is increasing at a rate of 0.03 meter per year. According to this model, what is the rate of change of the height of the tree with respect to time, in meters per year, at the time when the tree is 50 meters tall? Show Step-by-step Solutions AP Calculus AB 2018 Free Response Question 5 Working with a function. Find average rate of change. Slope of tangent line using product rule. Absolute minimum using Candidates Test. Applying L'Hopital's Rule to a limit. You should definitely review the Unit Circle since trig values came up a lot during the 2018 exam. 5. Let f be the function defined by $f(x) = e^x \cos x$. (a) Find the average rate of change of f on the interval $0 \leq x \leq \pi$. (b) What is the slope of the line tangent to the graph of f at $x = 3\pi/2$? (c) Find the absolute minimum value of f on the interval $0 \leq x \leq 2\pi$. Justify your answer. (d) Let g be a differentiable function such that $g(\pi/2) = 0$. The graph of g' , the derivative of g , is shown below. Find the value of g or state that it does not exist. Justify your answer. Show Step-by-step Solutions AP Calculus AB 2018 Free Response Question 6 6. Consider the differential equation $dy/dx = 1/3 x(y - 2)^2$. (a) A slope field for the given differential equation is shown below. Sketch the solution curve that passes through the point $(0, 2)$, and sketch the solution curve that passes through the point $(1, 0)$. (b) Let $y = f(x)$ be the particular solution to the given differential equation with initial condition $f(1) = 0$. Write an equation for the line tangent to the graph of $y = f(x)$ at $x = 1$. Use your equation to approximate $f(0.7)$. (c) Find the particular solution $y = f(x)$ to the given differential equation with initial condition $f(1) = 0$. Show Step-by-step Solutions Try the free Mathway calculator and problem solver below to practice various math topics. Try the given examples, or type in your own problem and check your answer with the step-by-step explanations. 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