

BC Calculus
2020 Exam Practice
FR #4 (25 minutes: 15 points)

Name _____

Set a timer for 25 minutes to complete this problem. You may use your notes, textbooks, or any materials I gave you throughout the year. You are not expected to use a calculator, but you may use one if you would like. You should show all your steps as if you did not have a calculator. I am guessing that the 25-minute problem will be worth 15 points and the 15-minute problem will be worth 10 points for a total of 25 points. The college board has said that the 25-minute problem will be worth 60% and the 15-minute problem will be worth 40%, so that is my best guess at how it may be broken down this year. Please show all appropriate mathematics: no bald answers!

Consider the function $f(x) = 2 \ln(x - 3)$, which passes through the point $(4,0)$.

- a) Find the equation of the line tangent to $f(x)$ at the point $(4,0)$. Use that equation to find an approximation for $f(4.2)$. [3 points]
- b) Is the approximation you found in part (a) greater than or less than the actual value of $f(4.2)$? Justify your answer. [2 points]
- c) Starting at the point $(4,0)$, use Euler's Method to approximate the value of $f(4.2)$ using two steps of equal size. [4 points]

Consider the function $f(x) = 2 \ln(x - 3)$, which passes through the point $(4,0)$.

- d) Find the third-degree Taylor Polynomial for $f(x)$, centered at $x = 4$. Use the polynomial to approximate the value of $f(4.2)$. [4 points]
- e) Show the setup of a definite integral that will yield the length of the curve of $f(x)$ from $x = 4$ to $x = 4.2$. You DO NOT have to evaluate the integral. [2 points]