

AP Calculus BC
Dr. Quattrin
2020 Spring Final #2

Name _____

score _____

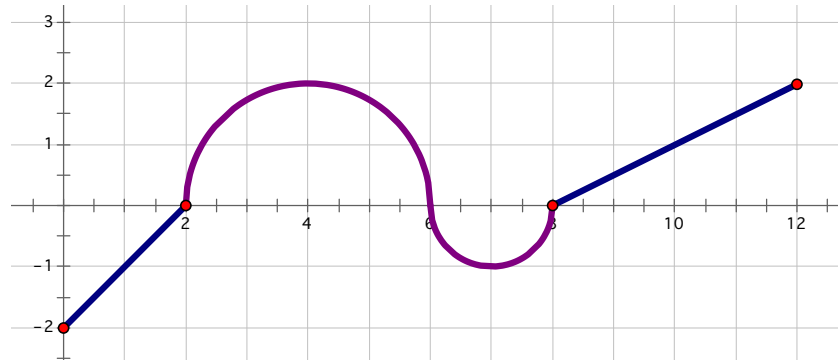
1. Consider the family of functions $f(x) = \frac{1}{2x^2 + kx - 12}$, where k is a constant.

(a) For $k = 2$, find the critical values of $f(x)$.

(b) For $k = 5$, find the value of $\int f(x) dx$. Show the work that leads to your answer.

(c) For $k=0$, find the value of $\int_1^{\infty} f(x)dx$ or show that it diverges. Show the work that leads to your answer.

2. A particle is moving along the x -axis so that its velocity $v(t)$ is given by the continuous function whose graph at time $t \in [0, 12]$ is shown below.



The graph is comprised of two line segments and two semicircles.

- a) At what time(s), if any, does the particle switch directions? Justify your answers
- b) Find the average rate of change of the particle's velocity on $t \in [0, 12]$. Does the Mean Value Theorem guarantee a time where the particle's acceleration equals this average rate of change? Explain.

c) What is the total distance traveled by the particle on $t \in [0, 12]$?

d) If the initial position of the particle at time $t = 12$ is $x(12) = 5$, what is the position at $t = 6$?