

6. [13 points] The following are tables of values for two differentiable functions $f(x)$ and $g(x)$ and their derivatives. Missing values are denoted by a “?”. Assume that each of these functions is defined for all real numbers, that $f'(x)$ and $g'(x)$ are continuous, and that $g(x)$ is invertible.

x	0	2	3	6	9
$f(x)$	-1	?	0	-2	?
$f'(x)$	1	4	-1	?	1

x	-1	1	3	7	11
$g(x)$	-4	1	2	6	7
$g'(x)$	7	?	3	4	?

- a. [4 points] For each of the following, find the value exactly. If there is not enough information to find the quantity, write NEI.
- i. [2 points] Let $z(x) = f(g(x))$. Find $z'(3)$.

Answer: $z'(3) =$ _____

- ii. [2 points] Let $j(x) = g^{-1}(x)$. Find $j'(7)$.

Answer: $j'(7) =$ _____

- b. [2 points] Use a left-hand Riemann sum with three equal subintervals to estimate $\int_{-1}^{11} g(x) dx$. Write out all the terms in your sum.

Answer: _____

- c. [1 point] Is your answer in part **b.** an overestimate or an underestimate? Circle your answer. If there is not enough information circle NEI.

Answer: OVERESTIMATE UNDERESTIMATE NEI

- d. [4 points] The function $f(x)$ has two critical points, at $x = 2.5$ and $x = \pi$. These are the only critical points of $f(x)$. For each critical point, decide if it is a local max, local min, neither, or if there is not enough information to determine this (NEI). Circle your answers.

Answer: $x = 2.5$ is a: LOCAL MIN LOCAL MAX NEITHER NEI

Answer: $x = \pi$ is a: LOCAL MIN LOCAL MAX NEITHER NEI

- e. [2 points] On which of the following interval(s) *must* $f(x)$ have an inflection point? Circle all correct answers.

[0, 3]

[2, 3]

[3, 9]