8. [9 points] Given below is a table of values for a function $g(x)$ and its derivative $g'(x)$. The functions $g(x)$, $g'(x)$, and $g''(x)$ are all defined and continuous for all real numbers.

x	-3	-2	0	2	3	4	6	8
$g(x)$	2	3	7	9	5	1	-5	-7
$g'(x)$	0	4	1	0	-2	-4	-1	-3

Assume that between consecutive values of x given in the table above, $g(x)$ is either **always increasing** or **always decreasing**.

Find the quantities in **a.**–**c.** **exactly**, or write NEI if there is not enough information provided to do so. You do not need to show work, but limited partial credit may be awarded for work shown.

a. [1 point] $\displaystyle\int_3^6 g(x)\,dx$

Answer: **NEI**

b. [2 points] $\displaystyle\int_{-2}^2 3g'(x)\,dx$

Solution: $3(g(2)-g(-2)) = 3(9-3) = 18$

Answer: 18

c. [3 points] $\displaystyle\int_0^4 \big(g''(x)+x\big)\,dx$

Solution:

$$\int_0^4 \big(g''(x)+x\big)\,dx = \int_0^4 g''(x)\,dx + \int_0^4 x\,dx = (g'(4)-g'(0)) + \left(\frac{(4)^2}{2} - \frac{(0)^2}{2}\right)$$
$$= (-4-1)+8$$

Answer: 3

d. [2 points] Use a right-hand Riemann sum with three equal subdivisions to estimate $\displaystyle\int_2^8 g(x)\,dx$. Write out all the terms in your sum.

Solution: $\Delta x = (8-2)/3 = 2$, so the Riemann sum is

$$g(4)\cdot 2 + g(6)\cdot 2 + g(8)\cdot 2 = 2\,(1+(-5)+(-7)) = -22$$

e. [1 point] Does the answer to part **d.** overestimate, underestimate, or equal the value of $\displaystyle\int_2^8 g(x)\,dx$? Circle your answer. If there is not enough information, circle NEI.

Answer: OVERESTIMATE $\boxed{\text{UNDERESTIMATE}}$ EQUAL NEI