1. [13 points] Let g be a function such that $g''(x)$ is defined for all real numbers. A table of values of $g'(x)$, **the derivative of** $g(x)$, is given below.

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

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

For parts **a.–f.**, circle **all** correct choices.

a. [1 point] At which of the following values does $g(x)$ have a critical point?

$x=-5$ $\boxed{x=-1}$ $x=0$ $x=3$ $\boxed{x=4}$ $x=7$ NONE OF THESE

b. [2 points] On which of the following intervals is $g(x)$ always decreasing?

$(-5,-1)$ $\boxed{(-1,0)}$ $\boxed{(0,3)}$ $\boxed{(3,4)}$ $(4,7)$ NONE OF THESE

c. [2 points] At which of the following values does $g(x)$ have a local maximum?

$\boxed{x=-1}$ $x=0$ $x=3$ $x=4$ NONE OF THESE

d. [2 points] On which of the following intervals is $g(x)$ always concave down?

$\boxed{(-5,-1)}$ $\boxed{(-1,0)}$ $(0,3)$ $(3,4)$ $(4,7)$ NONE OF THESE

e. [2 points] At which of the following values does $g(x)$ have an inflection point?

$x=-1$ $\boxed{x=0}$ $x=3$ $x=4$ NONE OF THESE

f. [2 points] Suppose that $g(7)=0$ and $g''(x)<0$ for all $x>7$. Which of the following values of $g(10)$ are possible?

$\boxed{g(10)=-5}$ $\boxed{g(10)=2}$ $g(10)=6$ $g(10)=11$ NONE OF THESE

g. [2 points] Use the table to give the best possible estimate of $g''(-3)$.

Solution: Since -3 is between -5 and -1, we find the average rate of $g'(x)$ on the interval $(-5,-1)$ to estimate the derivative of g' at -3, i.e. $g''(-3)$:

$$\frac{3-0}{-5-(-1)}=\frac{3}{-4}.$$

Answer: $g''(-3)\approx$ $\frac{-3}{4}$