8. [12 points] In Ann Arbor, the average property value P, in dollars per square foot, can be modeled as a function of the distance x, in miles, you are away from the city center. This relationship can be written $P = g(x)$. Below is a table containing information about $g(x)$. Use the information in the table to answer the parts of this question.

x	0.1	0.2	0.3	0.4	0.5
$g(x)$	200	162	142	130	119
$g'(x)$	-401	-298	-160	-115	-118

a. [3 points] Estimate $g'(0.15)$ using only values of $g(x)$ from the table.

Solution:
$$g'(0.15) \approx \frac{g(0.2) - g(0.1)}{0.2 - 0.1} = \frac{162 - 200}{0.1} = -380$$

b. [3 points] Estimate $g''(0.45)$ using only values of $g'(x)$ from the table.

Solution:
$$g''(0.45) \approx \frac{g'(0.5) - g'(0.4)}{0.5 - 0.4} = \frac{-118 - (-115)}{0.1} = -30$$

c. [3 points] Assuming the concavity of $g(x)$ does not change on the interval $0.1 < x < 0.3$, do you expect $g(x)$ to be concave up, concave down, or neither over this interval? Explain.

I expect $g(x)$ to be _____**concave up**_____ *because* . . .

Solution: . . . $g'(x)$ is increasing on the interval $0.1 < x < 0.3$.
. . . $g(x)$ decreases more between $x = 0.1$ and $x = 0.2$ than between $x = 0.2$ and $x = 0.3$.

d. [3 points] Write a sentence expressing the meaning of

$$g'(0.3) = -160$$

which could be understood by someone who knows no calculus. The beginning of the sentence is given below.

If I am 0.3 miles from the center of Ann Arbor looking at properties and I travel 0.05 miles toward the city center, . . .

Solution: . . . average property values will increase by about 8 dollars per square foot.