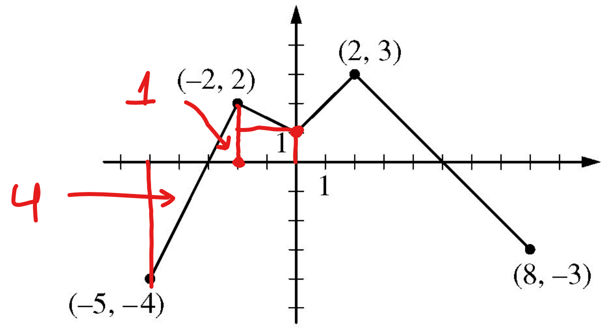

Graph of f

$g'(x) = 2 + f(x)$

4. The continuous function f is defined on the interval $-5 \le x \le 8$. The graph of f, which consists of four line segments, is shown in the figure above. Let g be the function given by $g(x) = 2x + \int_{-2}^{x} f(t)\,dt$.

(a) Find $g(0)$ and $g(-5)$.

$g(0) = 2(0) + \int_{-2}^{0} f(t)\,dt = 0 + 2 + 1 = 3$

$g(-5) = 2(-5) + \int_{-2}^{-5} f(t)\,dt = -10 - 1 + 4 = -7$

(b) Find $g'(x)$ in terms of $f(x)$. For each of $g''(4)$ and $g''(-2)$, find the value or state that it does not exist.

$g'(x) = 2 + f(x)$

$g''(x) = f'(x)$

$g''(4) = f'(4) = \frac{-6}{6} = -1$

$g''(-2) = f'(-2)$ Does not exist

Continue problem 4 on page 17.

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NO CALCULATOR ALLOWED

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(c) On what intervals, if any, is the graph of g concave down? Give a reason for your answer.

$g'' < 0$

$(-2, 0)$ $(2, 8)$

↓ OR

f' is negative

or

f is decreasing

(d) The function h is given by $h(x) = g(x^3 + 1)$. Find $h'(1)$. Show the work that leads to your answer.

composition require chain Rule

$h'(x) = g'(x^3+1) \cdot (3x^2)$

$h'(1) = g'(1^3+1) \cdot (3 \, 1^2)$

$= g'(2)\,(3)$

↓

$[2 + f(2)][3]$

$[2+3][3] = \boxed{15}$

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GO ON TO THE NEXT PAGE.