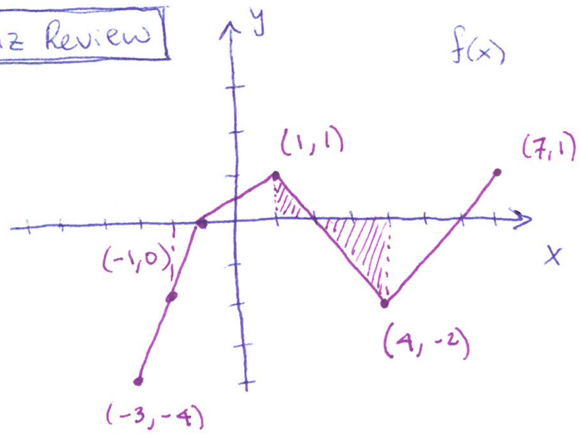
AP Calculus AB

Quiz Review



The graph of the function f below consists of 4 lines. Let g be the function

$$g(x) = \int_1^x f(t)\,dt$$

for $-3 \le x \le 7$.

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

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

(a) Find the value(s) of x or state that there are none where g(x) has a point of inflection.

g(x) has an inflection point when $g''(x) = f'(x)$ changes sign hence at $\boxed{x = 1 \text{ and } x = 4}$.

(b) For each of g(4), g'(4) and g''(4) find the value or state that it does not exist.

$g(4) = \int_1^4 f(t)\,dt = \frac{1}{2}(1)(1) - \frac{1}{2}(2)(2) = \frac{1}{2} - 2 = \boxed{-\frac{3}{2}}$

$g'(4) = f(4) = \boxed{-2}$

$g''(4) = f'(4) = \boxed{DNE}$

(c) Find the interval(s) where g(x) is increasing. Justify.

g(x) is increasing when $g'(x) > 0$; thus when $f(x) > 0$

So on $\boxed{(-1, 2) \text{ and } (6, 7)}$.

(d) Find the interval(s) where g(x) is concave down. Justify.

g(x) is concave down when $g''(x) < 0$; thus when $f'(x) < 0$ as $g''(x) = f'(x)$. So on $\boxed{(1, 4)}$

(e) Find all values of x in $[-3, 7]$ where $g(x) = 0$.

$g(x) = 0$ when the area above the x-axis equals the area below the x-axis.

Thus at $\boxed{x = 1, 2 \text{ and } x = -2}$