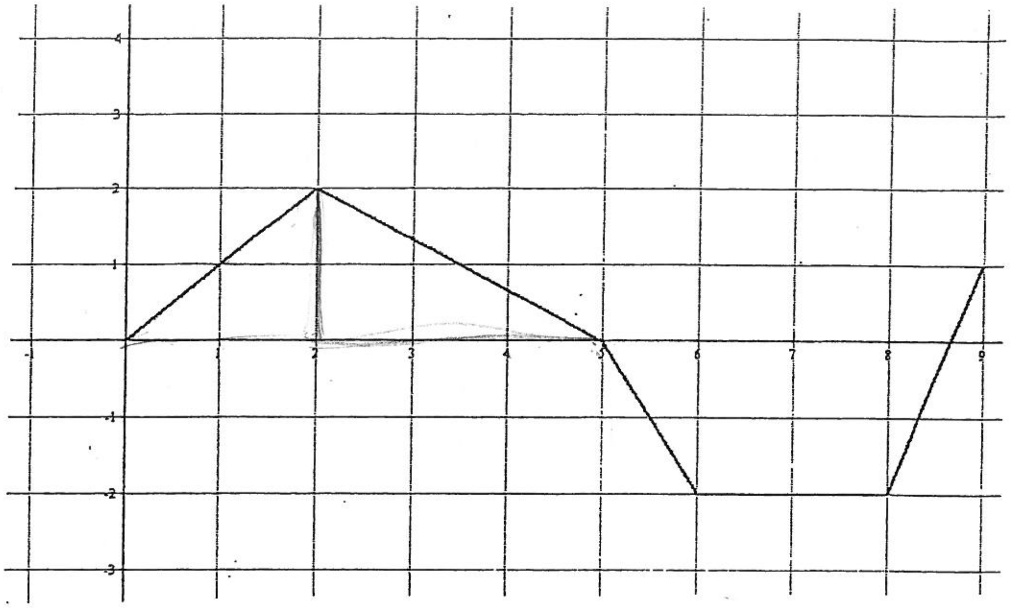


The graph of the function f is shown above. The domain of f is $0 \le x \le 9$.

Let g be the function defined by: $g(x) = \int_2^x f(t)dt$ $g'(x) = f(x)$ $g''(x) = f'(x)$

a) Find the value of $g(5)$. $= \int_2^5 f(t) = \frac{1}{2} \cdot 3 \cdot 2 = 3$

b) Find the value of $g(0)$. $= \int_2^0 f(t) = -\int_0^2 = -(\frac{1}{2} \cdot 2 \cdot 2) = -2$

c) Find the value of $g'(1)$. $= f(1) = 1$

d) Find the value of $g'(5)$. $= f(5) = 0$

e) Find the value of $g''(3)$. $= \frac{f(2) - f(5)}{2 - 5} = \frac{2 - 0}{-3} = -2/3$

f) Find the value of $g''(5)$. $=$ DNE

g) For what values of x in the interval [0, 9] is g increasing. Justify your answer.

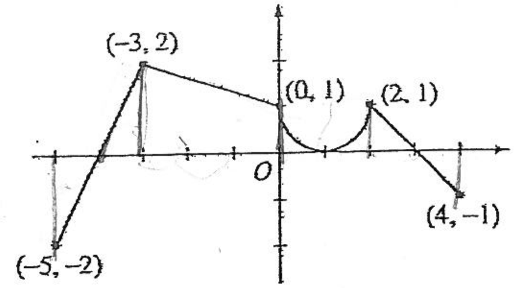
$f(x) > 0$ $g'(x) = f(x)$
$g(x)$ is increasing when $0 < x < 5$ and $8.5 < x < 9$
because $g'(x)$ or $f(x)$ is positive.

h) For what values of x in the interval [0, 9] is the graph of g concave up? Justify your answer.

$g''(x) = f'(x)$ $f' > 0$ which means f increasing
$g(x)$ is concave up when $0 < x < 2$ and $8 < x < 9$
because $g''(x)$ is positive or $g'(x)$ is increasing.

i) Find the absolute minimum value of g on the interval [0, 9]. Justify your answer.

j) State all the x-coordinate of all inflection points of the function g.



Graph of f

5. The graph of the function f shown above consists of a semicircle and three line segments. Let g be the function given by $g(x) = \int_{-3}^{x} f(t)\,dt$. $g'(x) = f(x)$ $g'' = f'$

(a) Find $g(0)$ and $g'(0)$.

(b) Find all values of x in the open interval $(-5, 4)$ at which g attains a relative maximum. Justify your answer.

(c) Find the absolute minimum value of g on the closed interval $[-5, 4]$. Justify your answer.

(d) Find all values of x in the open interval $(-5, 4)$ at which the graph of g has a point of inflection.

d. $g(x)$ has a point of inflection at $x = -3, 1, 2$ bc g'' changes sign

a. $g(0) = \int_{-3}^{0} = \frac{1}{2} \cdot 3 \cdot (2+1) = \frac{1}{2} \cdot 3 \cdot 3 = 9/2$

$g'(0) = f(0) = 1$

b. $g(x)$ has a rel max at $x = 3$ bc $g'(x)$ or $f(x)$ goes from + to −

c.

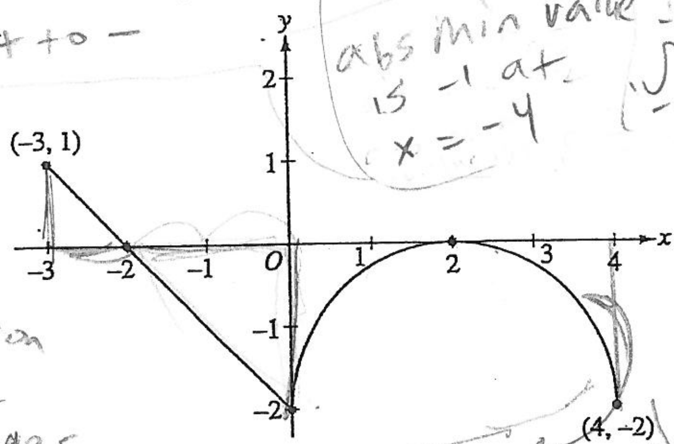
x	y
−5	0
−4	−1
4	2+

$\int_{-3}^{-5} = -\int_{-5}^{-3} = 0$

$\int_{-3}^{4} = 9/2 + (2 - \pi/2) + 0$

$\int_{-3}^{-4} = -\int_{-4}^{-3} = -(\frac{1}{2} \cdot 1 \cdot 2) = -1$

abs min value is −1 at $x = -4$



Graph of f'

negative since underneath x-axis

a. $f(x)$ is incr when $-3 < x < -2$ bc $f' > 0$

b. f has inflection at $x = 0, 2$ bc $f''(x)$ changes sign

c. $f'(0) = -2$

$y - 3 = -2x$

$y = -2x + 3$

d. $f(-3) = f(0) + \int_{0}^{-3}$

$3 - \int_{-3}^{0}$

$3 - (\frac{1}{2} - (\frac{1}{2} \cdot 2 \cdot 2))$

$3 - (\frac{1}{2} - \frac{4}{2})$

$3 - (-\frac{3}{2})$

$3 + \frac{3}{2} = \frac{9}{2}$

4. Let f be a function defined on the closed interval $-3 \le x \le 4$ with $f(0) = 3$. The graph of f', the derivative of f, consists of one line segment and a semicircle, as shown above.

(a) On what intervals, if any, is f increasing? Justify your answer.

(b) Find the x-coordinate of each point of inflection of the graph of f on the open interval $-3 < x < 4$. Justify your answer.

(c) Find an equation for the line tangent to the graph of f at the point $(0, 3)$.

(d) Find $f(-3)$ and $f(4)$. Show the work that leads to your answers.

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$f(4) = f(0) + \int_{0}^{4}$

$f(4) = 3 - (8 - \frac{\pi}{2} \cdot 4)$

$f(4) = 3 - (8 - 2\pi)$

$f(4) = -5 + 2\pi$