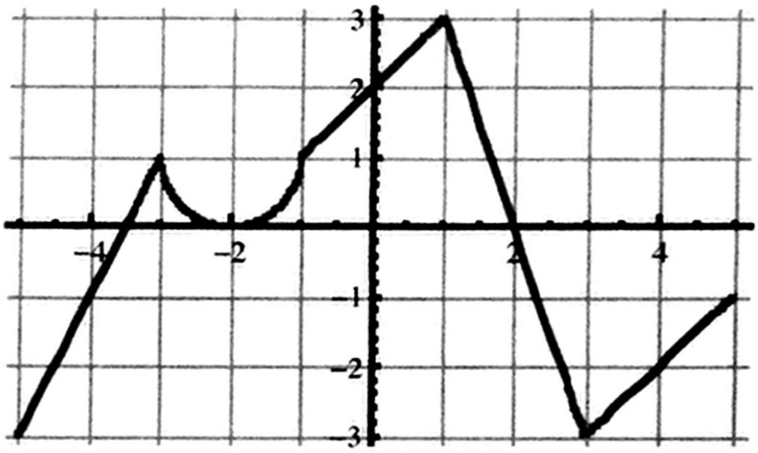
Dover

Problem Two (Ostebee/Zorn)

P. 330 Let $F(x) = \int_0^x f(t)\,dt$ where f is the function graphed with straight lines and a semicircle.



(a) Identify all critical points of F in the interval $[-5, 5]$.

$x = -3.5, -2, 2$

(b) Where in the interval $[-5, 5]$ is F decreasing. Justify your answer.

$[-5, -3.5], [2, 5]$ since $F' = f$ is negative

(c) Evaluate $F(0)$, $F'(0)$, and $F''(0)$.

$0, 2, 1$

(d) Evaluate $F(2)$, $F'(2)$, and $F''(2)$.

$4, 0, -3$

(e) Identify all the inflection points of F in the interval $[-5, 5]$. Justify.

$x = -3, -2, 1, 3$ where $F' = f$ changes from inc to dec or from dec to inc

(f) Find an equation of the tangent line to the graph of $y = F(x)$ at $x = -1$.

$F(-1) = -\frac{3}{2}$

$F'(-1) = 1$

$y + \frac{3}{2} = 1 \cdot (x+1)$

(g) Find an equation of the tangent line to the graph of $y = F(x)$ at $x = 4$.

$F(4) = 0$

$F'(4) = -2$

$y - 0 = -2(x-4)$

(h) Let $G(x) = \int_0^x F(t)\,dt$. On which subintervals of $[-5, 5]$, if any, is G concave upward?

G conc up when G'' is positive

$G' = F$,

$G'' = F' = f$

$(-3.5, -2) \cup (-2, 2)$