DAY 35 The Second Derivative §2.5

p. 109-111 #16-23, 27-31

PSAT day HW

(16)

Time t (sec)	0	1	2	3	4	5
Velocity $v(t)$ ft/sec	0	30	52	68	80	88

not the answer to question asked.

Average Acceleration over $t \in (0,2)$

$$\frac{V(2)-v(0)}{2-0} = \frac{52-0}{2-0} = 26 \left(\frac{ft/sec}{sec}\right) = 26 \frac{ft}{sec^2}$$

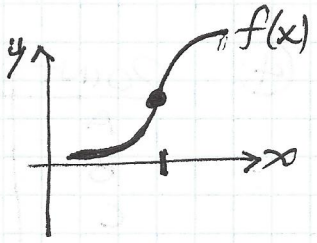
Try again

over each $t \in (0,1)$ & $t \in (1,2)$

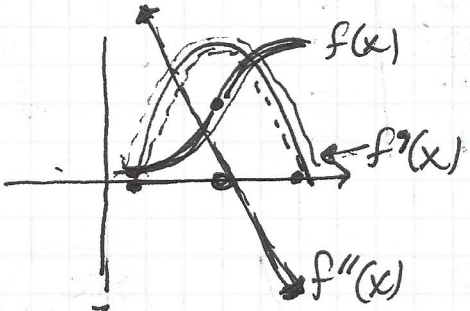
$$\frac{V(1)-v(0)}{1-0} = \frac{30-0}{1-0} = 30 \frac{ft}{sec^2}$$

$$\frac{V(2)-v(1)}{2-1} = \frac{52-30}{2-1} = \frac{22}{1} = 22 \frac{ft}{sec^2}$$

(17) a) Slope > 0 first increasing then decreasing



b) $f''(x)$

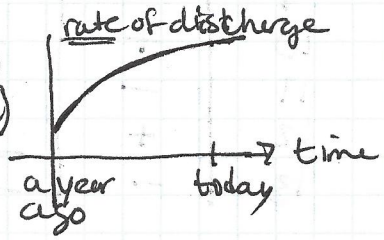


c) $f''(x)$

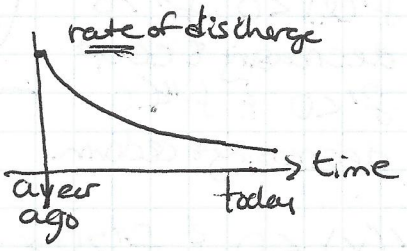
(18)–(23) see graphs on paper. *

(27)

a)



b)



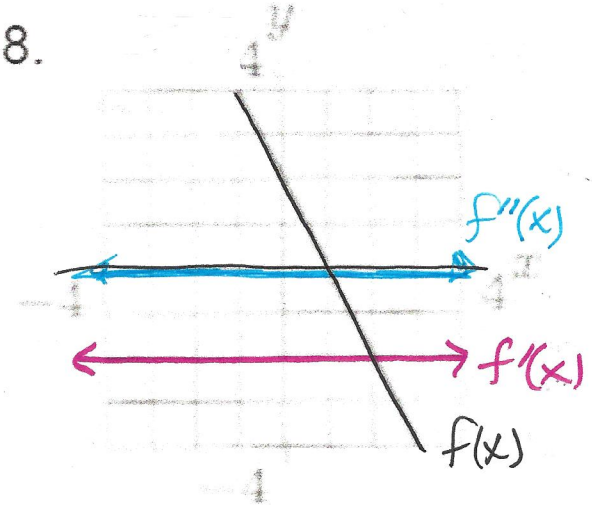
The rate of discharge is positive in case (a) & case (b) indicating that the level of toxic pollutants in the lake has been increasing over the past year.

* In case (a) the rate of discharge is increasing but at an increasing rate, meaning that over the past year not only has the level of toxic pollutants in the lake increased, they have increased by increasing amounts over the past year. This is causing the problem to get worse

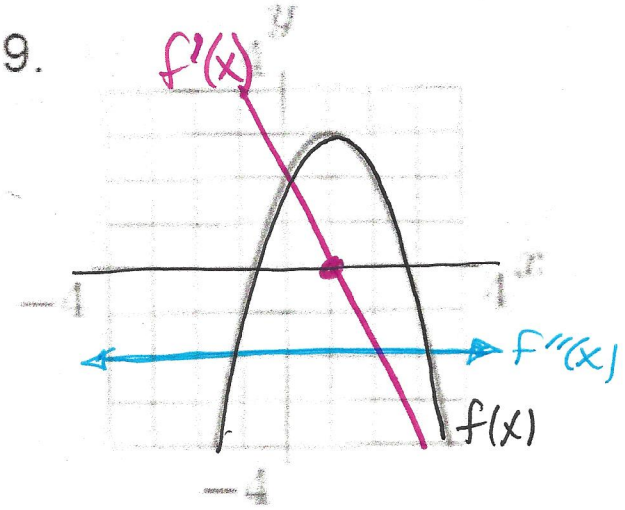
* In case (b) the rate of discharge is increasing at a decreasing rate, meaning that although the level of toxic pollutants in the lake has increased, they have increased by decreasing amounts. This is helping to improve the problem.

Day 35 HW pp 109-111 18-23 $f(x)$ $f'(x)$ $f''(x)$

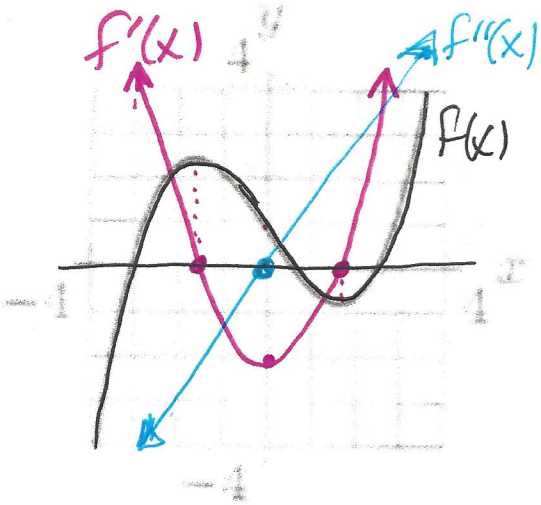
18.



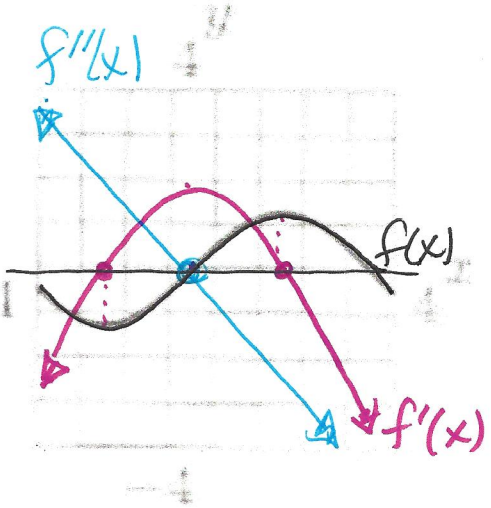
19.



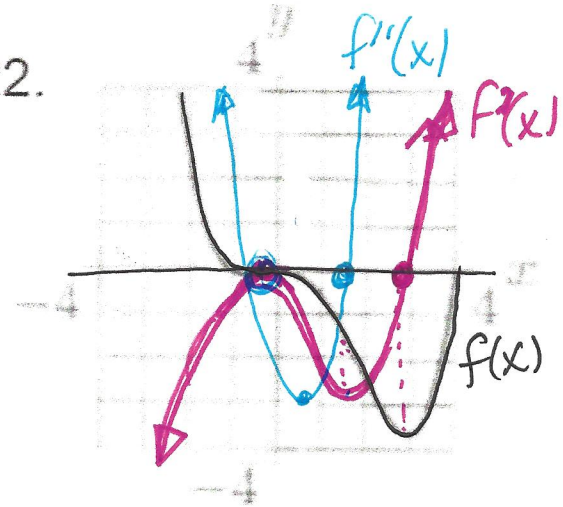
20.



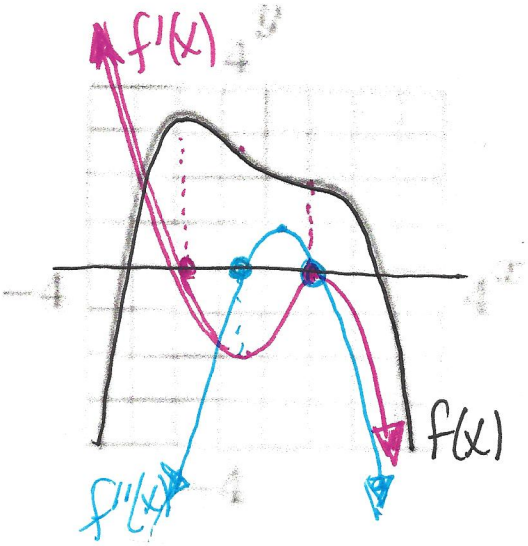
21.



22.



23.

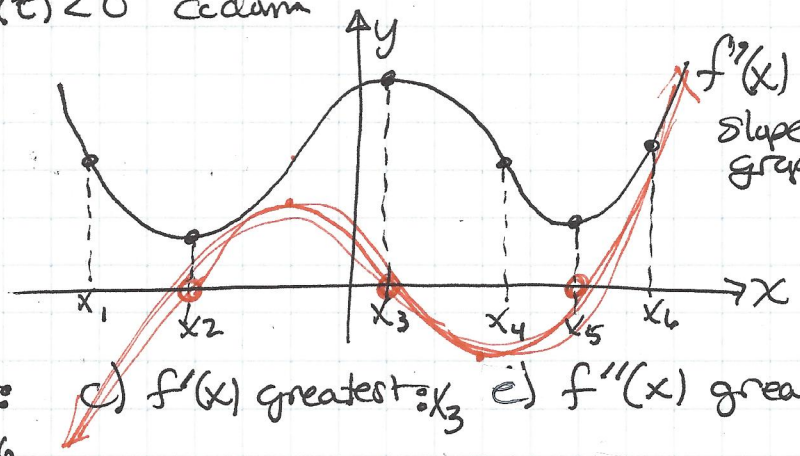


DAY 35 — §2.5 The Second Derivative continued — p. 109–111 #28–31

(28) see figure 2.52
a) $f(x) < 0$: x_4, x_5
b) $f'(x) < 0$: x_3, x_4
c) $f(x)$ decreasing : x_3, x_4
d) $f'(x)$ is decreasing : x_2, x_3
↳ $f''(x) < 0$ ccdown.
e) slope of $f(x) > 0$: x_1, x_2, x_5
f) slope of $f(x)$ is increasing : x_1, x_4, x_5
↳ $f''(x) > 0$ ccup.

(29) Figure 2.53
a) position is positive : t_3, t_4, t_5
$f(t) > 0$
b) velocity is positive : t_2, t_3
$f'(t) > 0$
c) acceleration positive : t_1, t_2, t_5
f ccup.
d) position is decreasing : t_1, t_4, t_5
$f'(t) < 0$
e) velocity is decreasing : t_3, t_4
$f''(t) < 0$ ccdown

(30) f' graph.



$f''(x)$ 2nd derivative graph.

a) $f(x)$ greatest : x_6
b) $f(x)$ least x_1
Since $f'(x) > 0$
$f(x_1) <$ all other $f(x)$
& $f(x_6) >$ all other $f(x)$.
c) $f'(x)$ greatest : x_3
d) $f'(x)$ least : x_2
e) $f''(x)$ greatest : x_6
f) $f''(x)$ least : x_1

(31) $f(5) = 20$, $f'(5) = 2$ } CONTINGENT LINE $y = 2(x-5) + 20$
$f''(x) < 0$ for $x \geq 5$: $f(7)$ may be:
a) 26
b) 24
c) 22
$y(7) = 2(2) + 20$
$y(7) = 24$
$f(7) > y(7)$ b/c f ccd