DAY 37 HW pp. 116–119 #2–8 even, 36, 40, 43, 46, 52, 55 (See Graphs on separate page 13–18, 20, 36)

Ch 2 REVIEW

#2–7: Find Avg Vel on [1,3] seconds. s(t) in mm. $AROC = \frac{\Delta y}{\Delta x}$

2) $s(t) = 12t - t^2$ ← y_1

$$\frac{s(3)-s(1)}{3-1} = \frac{[y_1(3)-y_1(1)]}{[3-1]} = \boxed{8 \frac{mm}{sec}}$$

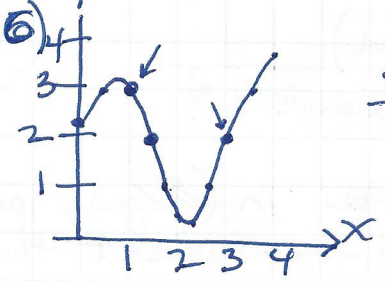
4)

t	0	1	2	3
s(t)	7	3	7	11

$$\frac{s(3)-s(1)}{3-1} = \frac{11-3}{3-1} = \frac{8}{2} = \boxed{4 \frac{mm}{sec}}$$

NOTE: * when given a table it is imperative that your calculation show → the values you pull from the table.

6)



$$\frac{s(3)-s(1)}{3-1} = \frac{2-3}{3-1} = \boxed{\frac{-1}{2} \frac{mm}{sec}}$$

8) t sec $s(t) = 4t^2 + 3$ meters from starting point.

a) Average Velocity on $t=1$ and $t=1+h$.

$$AROC = \frac{s(1+h)-s(1)}{(1+h)-1} = \frac{[4(1+h)^2+3]-[4(1^2)+3]}{h}$$

$$= \frac{[4(1+2h+h^2)+3]-[7]}{h} = \frac{(4+8h+4h^2)+3]-[7]}{h}$$

$$= \frac{8h+4h^2}{h} = \frac{h(8+4h)}{h} = \boxed{8+4h}$$

i) If $h=0.1 \rightarrow 8+4(0.1) = 8.4$ m/sec

ii) If $h=0.01 \rightarrow 8+4(0.01) = 8.04$ m/sec

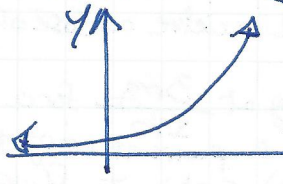
iii) If $h=0.001 \rightarrow 8+4(0.001) = 8.004$ m/sec

b) Instantaneous Velocity at $t=1$ $\therefore \lim_{h \to 0}(8+4h) = 8 \frac{m}{sec}$

(36) $f' > 0$ & $f'' > 0$

Sketch graph.

$\therefore$ Increasing & concave up.



Interpret: Every 20 years there are an additional 7 million cars in the US.

(40)

t (year)	2003	2004	2005	2006	2007
C (cars in millions)	135.7	136.4	136.6	135.4	135.9

a) $f'(t) > 0$: $t \in (2003, 2005), (2006, 2007)$

$f'(t) < 0$: $t \in (2005, 2006)$

b) $f'(2006) \overset{\text{estimate}}{\approx} \frac{135.9-136.6}{2007-2005} = \frac{.7}{2}$

$f'(2006) \approx 0.35 \frac{\text{millions of cars}}{\text{year}} \approx \frac{7}{20}$

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#43, 46, 52, 55

(43) The revenue (in thousands of $) earned by a gas station when price of gas is $p per gallon is $R(p)$

$(p, R) \Rightarrow \left(\frac{\$}{gal}, \frac{\text{thousands of } \$}{}\right)$ units.

a) $R'(3) \Rightarrow \frac{\text{thousands of } \$}{(\$/gal)}$

$R'(3)$ is the rate of change in (thousands of $) per ($ per gallon) at the moment gas costs $3 per gallon.

b) $(R^{-1})'(5) \Rightarrow$ units $\frac{(\$/gal)}{\text{thousands of } \$}$

$(R^{-1})'(5)$ is the rate of change in ($/gal) per (thousands of $) at the moment the gas station has revenue of $5000.

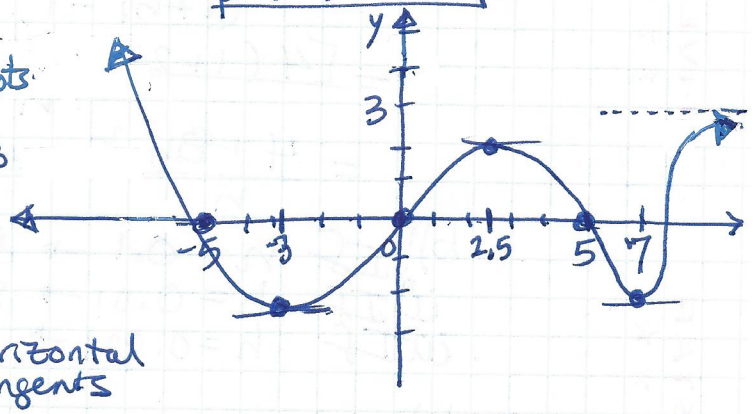
(46) $f(2)=3 \quad f'(2)=1$

If $f(x)$ is even then and $\boxed{f(-2)=3 \quad f'(-2)=-1}$

If $f(x)$ is odd then and $\boxed{f(-2)=-3 \quad f'(-2)=1}$

(52)
- $f(-5)=f(0)=f(5)=0 \rightarrow$ x-intercepts
- $\lim_{x\to\infty} f(x) = -3 \rightarrow$ HA at $y=-3$ as $x\to\infty$
- $\lim_{x\to-\infty} f(x) = \infty$
- $f'(-3)=f'(2.5)=f'(7)=0 \therefore$ Horizontal Tangents

these may be Min, Max or terrace points.



(55) Painkillers D = size of dose (milligrams) depends on weight of patient W (Pounds).

$D=f(W) \therefore (W, D) \Rightarrow$ (pounds, milligrams) $f'(W)$: units $\frac{\text{milligrams}}{\text{pound}} = \frac{dD}{dW}$

a) $f(140)=120$: A patient weighing 140 lbs should receive a dose of 120 mg of painkiller medication

$f'(140)=3$: the rate of change is increasing at $\frac{3\text{mg}}{1\text{lb}}$ for a patient weighing 140 lbs. Therefore a 1 pound increase in patient weight requires an additional 3 mg of painkiller

b) Estimate $f(145) \approx 135$ mg

$D = 3(W-140)+120$

$D = 3(145-140)+120$

$\approx 15+120$

≈ 135 mg

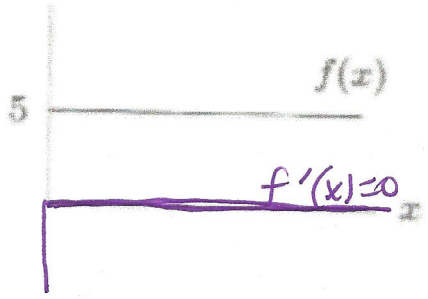
55 b) Estimate $f(145) \approx 135$ mg

DAY 37 HW pp116-119

Review Exercises.

Sketch the graphs of the derivatives of the functions shown in Exercises 13–18. Be sure your sketches are consistent with the important features of the graphs of the original functions.

13.



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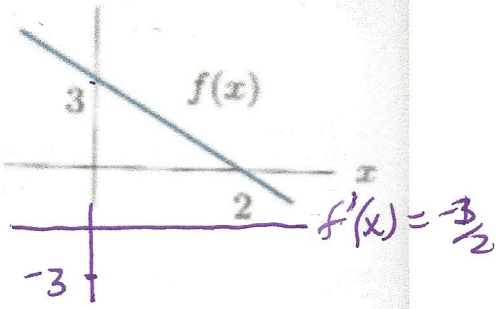

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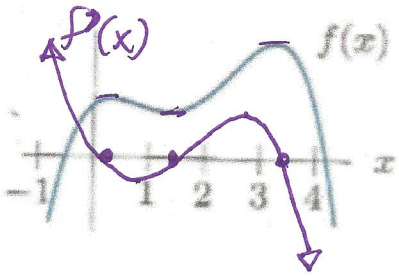

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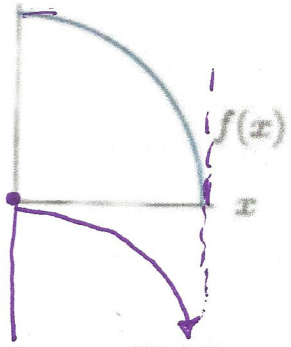
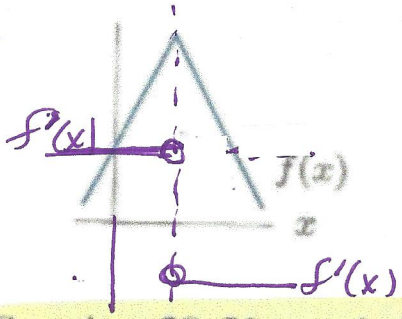
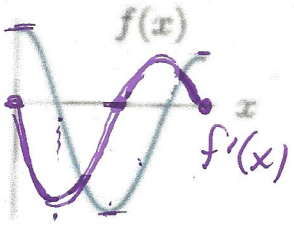


17.

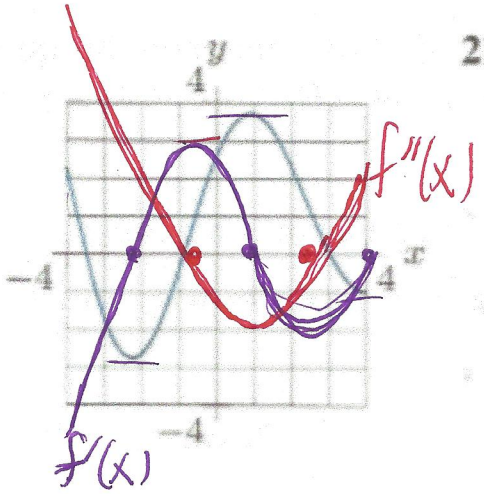


18.



In Exercises 20–21, graph the second derivative of the function.

20.



21.