

pg. 40-42

#7, 13, 46-49, 51, 54-59, 70, 72

7. increasing: $(-\infty, -2] \cup (4, \infty)$
decreasing: $(0, 4)$
constant: $x=4$

13. max: $(-1.5, 3), (1.5, 3) \rightarrow$ local
min: $(0, -1)$
 $\lim_{x \rightarrow -\infty} f(x) = -\infty, \lim_{x \rightarrow \infty} f(x) = -\infty$

46. a. $[4, 5] \quad \frac{f(5) - f(4)}{5 - 4} = \frac{85.5 - 80.6}{1} = 4.9^\circ$ The temperature increased 4.9° /month on average.

b. $[7, 11] \quad \frac{f(11) - f(7)}{11 - 7} = \frac{77.1 - 89.9}{4} = -3.2^\circ$ the temperature dropped 3.2° /month on average.

47. a. $[0, 10] \quad \frac{f(10) - f(0)}{10 - 0} = \frac{15.6 - 12}{10} = 0.36$ million lbs/year

b. $[5, 10] \quad \frac{f(10) - f(5)}{10 - 5} = \frac{15.6 - 11.925}{5} = 0.735$ million lbs/year

48. b. ^{abs.} max: $(3.79, 724.7)$
 \downarrow
July

c. rel max: $(8.6, 559.8)$
 \downarrow
December

49. a. $[5, 15] \rightarrow \frac{55 - 5}{15 - 5} = 5$; $[15, 20] \rightarrow \frac{70 - 55}{20 - 15} = 3$; $[25, 45] \rightarrow \frac{85 - 75}{45 - 25} = 0.5$

b. The average speed was fastest from 5 sec to 15 sec

c. higher rate of change = steeper graph = increasing

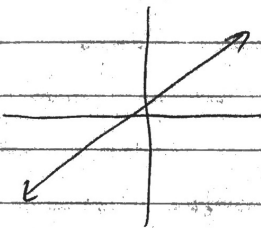
51. b. $\frac{I(10) - I(3)}{10 - 3} = \frac{39556 - 29589.525}{7} = 1280.925/\text{year}$

U.S. income increases \$1280.925/year.

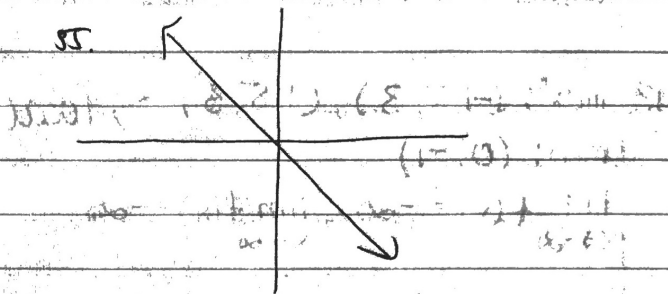
c. highest = [8, 12]

lowest = [3, 7]

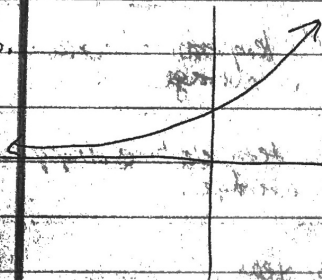
54



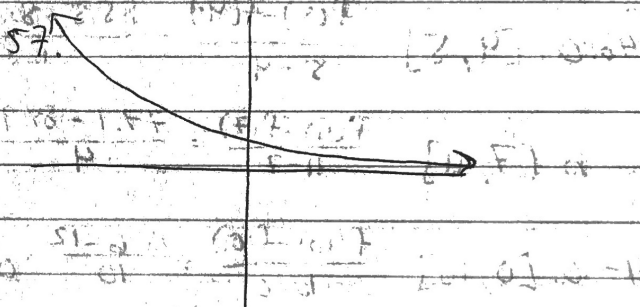
55



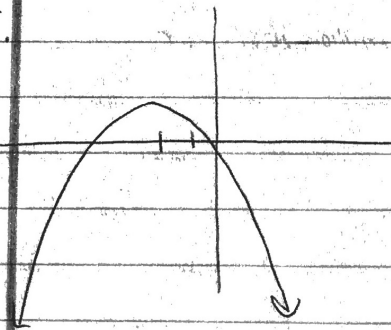
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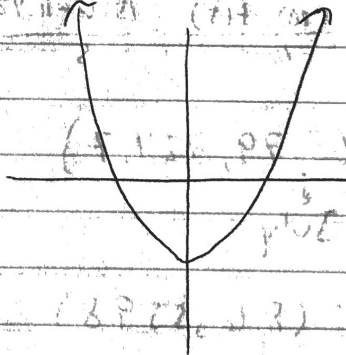
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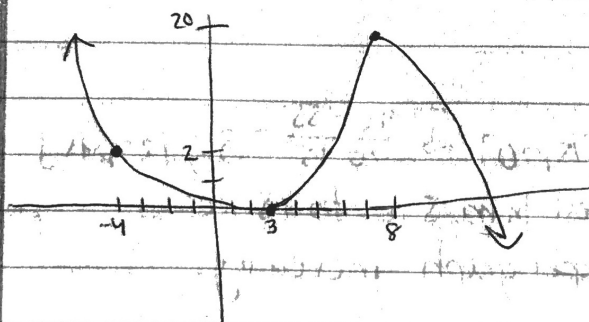
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59



70



72. Sometimes, it could dip down and come up again.

