Math 111
Winter 2012
Nichifor

Work Sheet 6

$3+6 = \frac{9}{10}$

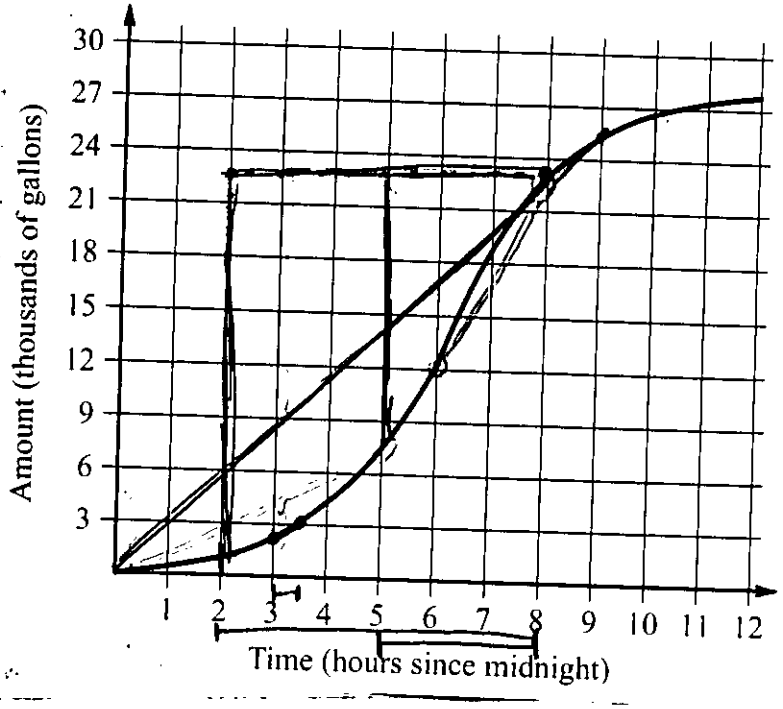
due 1/26/12
Math 111
Section BC
TA Light

① a. [23000 gal at $t=8$] − [1,000 gal at $t=2$] =
22,000 gal $m = a$

b. [23000 gal at $t=8$] − [7,500 gal at $t=5$] =
15,500 gal $m = b$

c. Slope of line from (0,0) to $t=9$ $m = c$
3 gal/hour

d. slope of line from $t=3$ to $t=3.5$ $m = d$
1.75 gal/hour



$m = a$
$m = b$
$m = c$
$n = D$
] Answers to question ①

$a = b$
$D = C$
] Answers to Question ③

② i) c
ii) a
iii) b
iv) d

(3)

a. the amount of water that has entered from 3:00am - 10:00 AM = 24.15 thousand gal

b. the overall average rate of flow of water into the reservoir from midnight to t = 5 = 1.5 gal/hour

c. the rate of flow of water into the reservoir over the two hour interval starting at t = 6 = 15.5 thousand gal/hour ☐ = C on graph

(4) ✓ ✓ ② ✓

Reservoir		Functional Notation	Graph Language
The (overall) average rate of flow from midnight to time t	C	$\frac{A(t)}{t}$	Slope of diagonal line to t hours
The amount of water that flows in from 2 hours to t hours	A	$A(t) - A(2)$	Change in height between t and 2
The amount of water that flows in from 5 hours to a time h hours later	B	$A(5+h) - A(5)$	change in height from t = 5 to 5+h
The (incremental) rate of flow from a time t hours to a time $\frac{1}{2}$-hour later	D	$\frac{A(t+\frac{1}{2}) - A(t)}{\frac{1}{2}}$	Slope of secant from t to $t+\frac{1}{2}$

(5)

i) the amount of water that flows in between t = 5 and h hours later

ii) the overall average rate of flow of water into the reservior from midnight to time t

iii) the rate of flow of water in to the reservior between time t and $t+\frac{1}{2}$

iv) the amount of water in the reservoir between time t and 2 hours

(6)

i) C
ii) A
iii) D
iv) B

put in table on last page

(7)

English	Functional Notation	Graph Language
The amount of water flowed in between 1 and 4	$A(4) - A(1)$	change in height between t=1 and t=4
the overall average rate of flow after 5 hours	$\frac{A(5)}{5}$	Slope of diagonal line to t=5
the rate of flow from t=1 to t=1+h	$\frac{A(1+h) - A(1)}{h}$	the slope of the secant line from $t = 1$ to $t = 1 + h$
The amount of water that flowed in between 1:00 and ~~on~~ t=T	$A(T) - A(1)$	the change in height from $t = 1$ to $t = T$
overall average rate of flow after 4 hours	$\frac{A(4)}{4}$	Slope of diagonal line to t=4
the incremental rate of flow from $t = 3$ to a time h hours later	$\frac{A(3+h) - A(3)}{h}$	the slope of the secant line from 3 to 3+h

8

a

i) 0 x/y ☆ = i on graph

ii) 0 x/y ∩ = ii on graph

iii) 9 ⊓ = iii on graph

b

i) 6-8 looked for where g(x) sloped down, then up

ii) 0-2, & 7-9 looked for a positive slope between 2 t points

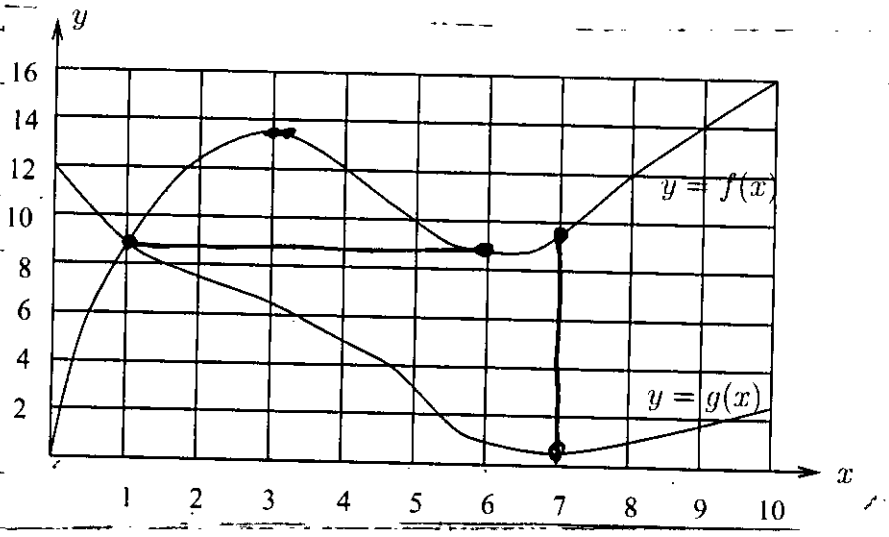
iii) 2-4 looked for an increase, a max then a decrease

c

i) X > 1.75 the difference between the f(x) graph and g(x) graph needed to be greater than or equal to 3. Looked at gap

ii) 0-3 the graph has a positive slope but the steepness is decreasing

iii) y=13.5 max point on f(x) graph while g(x) has negative slope



d.

i) B - Secant line from X to X + .02 slope

ii) D - diagonal line from (0, 0) to x, giving the slope

iii) C - vertical distance between x and x + .03

Math III Section BC
TA: Light
Due 1/26/12

Worksheet 7

(1) functional notation: $A(t) - A(2) = 16$
graphical translation: find t such that the ΔY between $t = 2$ and $t = 16$

(2) functional notation: $A(5+h) - A(5) = 18$
graphical translation: find a value of h such that the ΔY of the graph between 5 and $5+h$ is 18
the extra step is needed because the second X value is not given. it is given in terms of the first X value(s).

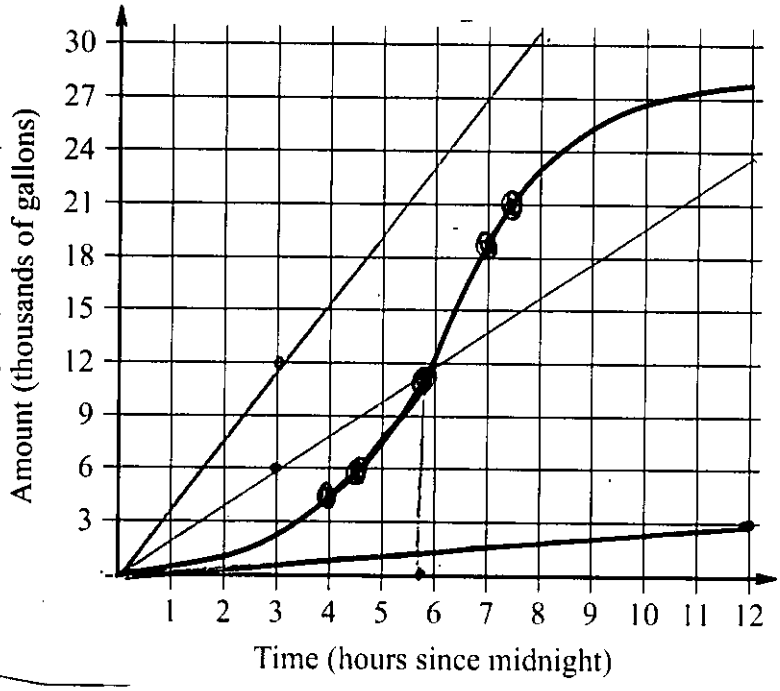
(3) $\boxed{t = 5.75}$

(4) $\frac{4}{1} \cdot \frac{3}{3} = \boxed{\frac{12}{3}}$:
Reference line is in ~~green~~ Red

(5) $t = \boxed{7.5 \text{ or } 4.5}$ M = 5 answer

(6) functional notation:
$\frac{A(t+1.5) - A(t)}{1.5} = 6$
graphical language
find an hour and a half interval where $\Delta y = 6$

(7) $\boxed{X = 4.5 - 6}$
m = 7's answer



Key:
M = Q3
m = disregard
M = Q4
M = Q5
M = Q7

(8)

a. 1.9 lbs − 1.3 lbs = .6 lbs $m = a$

b. 48 − 54 hours $m = b$ HOW? ①

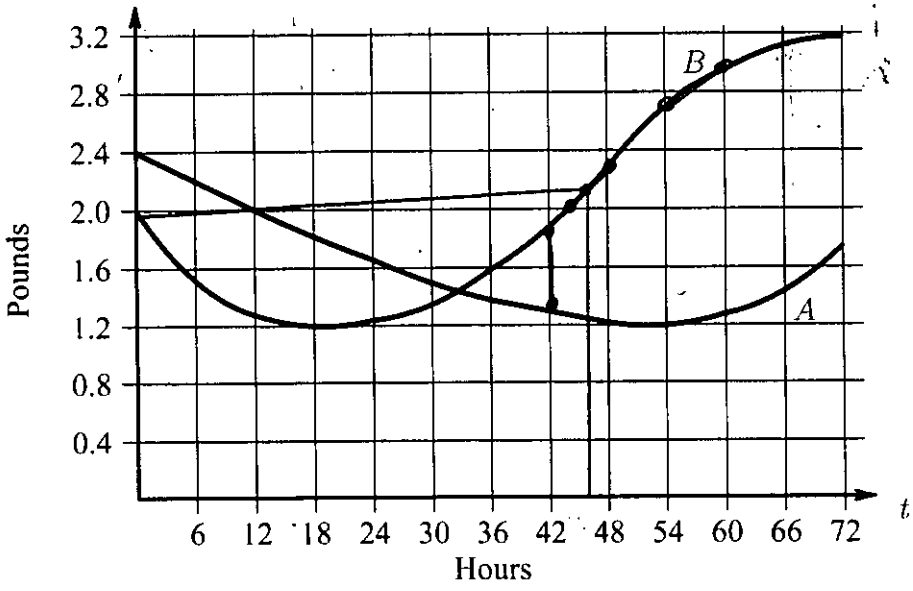
c. $t = 50.5$ $m = c$

d. (60, 3) (54, 2.7)

$\frac{3 - 2.7}{60 - 54} = \frac{.3}{6} = \frac{1}{20}$ lbs/hr $m = d$

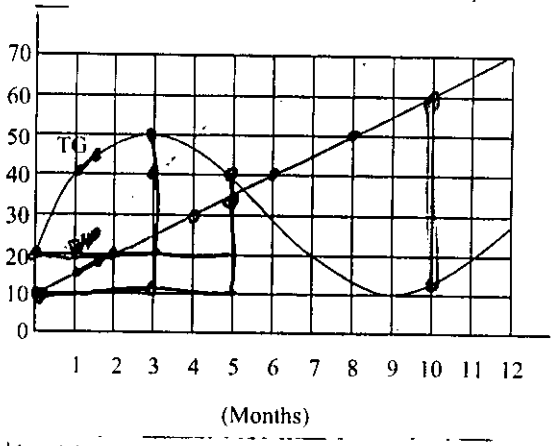
e. $t = 66$ $\Delta R = 3.1 - 1.4 = 1.7$ lbs

f. puppy A lost (2.0 − 1.21) = .79 lbs in the first 24 hours
puppy C would lose $([2 \cdot \frac{3}{4}] - [1.21 \cdot \frac{3}{4}])$ = .59 lbs in the first 24 hours



Key:
$m = Qa$
$m = Qb$
$m = Qc$
$m = Qd$

(9)



a) $m = ST$

b) $TG = (50 - 20) =$ 30$ $m = b$
$ST = (40 - 10) =$ 30$ $m = b$

c) $t = 1.5$

d) $\frac{f(6) - f(0)}{6} = \frac{29 - 20}{6} =$ 1.5$/month

Key =
$m = Qa$ $m = Qc$
$m = Qb$ $m = Qh$
as Q9

e) 2-4 months because the TG graph increases, makes out and decreases

f) 10-12 months because the $\Delta y = 15$ between $t=10$ and $t=12$

g) $t=10$ $\Delta\$ = (60-12) = 48$, greatest vertical gap $m = g$

h) TG $\Delta\$ = 39-20 = 19$ $m = h$

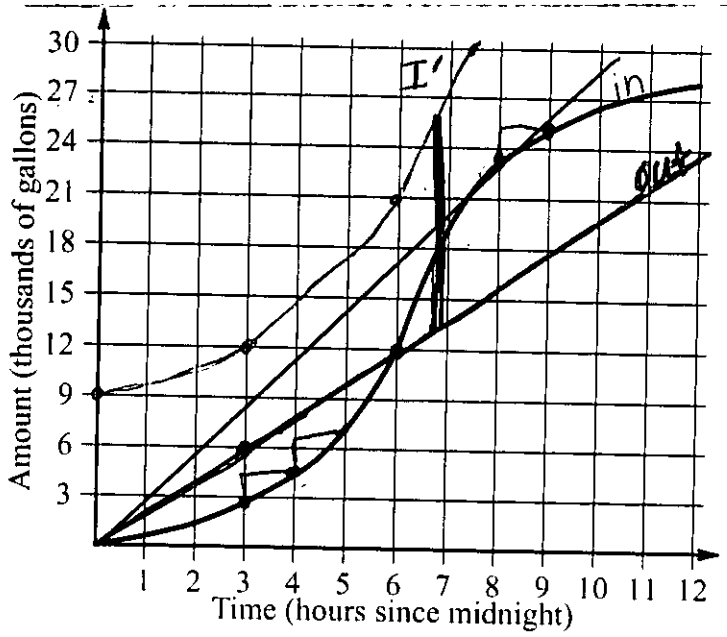
ST $\Delta\$ = 35-10 = 25$ $m = h$

(10)

a) $\frac{2000}{1} \cdot \frac{3}{3} = \frac{6000}{3}$ gal/hour

m = water out vs. time

b) 3,000 gallons needed because the "in" line is above the "out" line by ≈ 3000 gal at its largest gap



c) $t = 7.75$ steepest slope line $m = c$

d) $12,000 - 9,000 = 3,000$

$6.75 = t$

vertical distance between I' and out ≈ 12,000

$I' = I(0) + 9,000 = m$

$m = I' - \text{Out}$

e) $t=3, t=4, t=8$

$m = e$

f) $t=6$ to $t=8.5$ because the gap between in and out increases until $t=8.5$

Key =

m = water out vs time → Qa

m = "overall average rate of flow in" line → Qc

$m = I' = I(0) + 9,000$ → Qd

m = water in reservoir → Qd

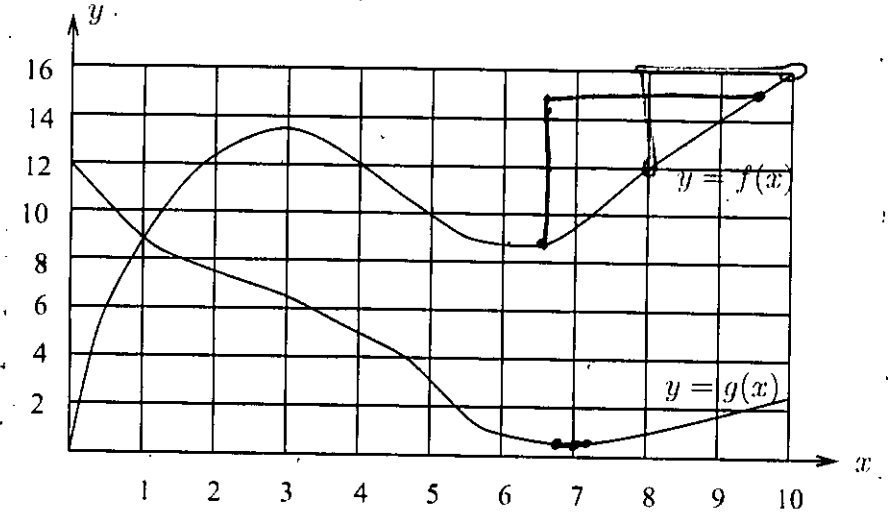
$m = \Delta g = 2000$ → Qe

g) $t = 9$ because the secant line between $t=9$ and $t=9.25$ is less than the diagonal total average line from $(0,0)$ to $t=9$

11) a) $x = 6.5$ because $\frac{f(6.5+3) - f(6)}{3} = 2$ or the vertical distance between 6 and 9.5 = 6. And to get slope $6/3 = 2$ $m = a$

b) $x = 6.9$ because $f(6.9+.02) - f(6.9)/.02 = 0$ or the vertical change between 6.9 and 7.1 is 0 $n = b$

c) $f(x+2) - f(x) = 4$, $x = 8$ because the vertical change is 4 between $t=8$ and $t=10$ $y = c$



Key:

$m = Qa$

$n = Qb$

$\square = Qc$