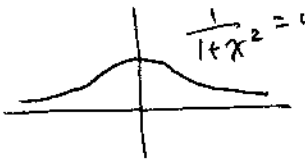
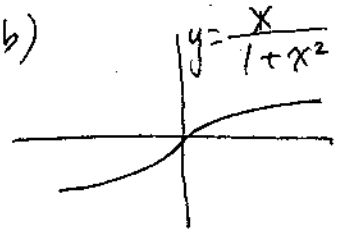
Assignment #21 4/6/2001

22.4

(#3) a) 

so, $\int_{-a}^{a} \frac{1}{1+x^2}\,dx$ = iii) $2\int_{0}^{a} \frac{1}{1+x^2}\,dx$

b) 

so, $\int_{-a}^{a} \frac{x}{1+x^2}\,dx$ = i) 0

(#8) a) $\int_0^5 7(f(t))\,dt = 7\int_0^5 f(t)\,dt = 70$

b) add $\underset{5}{\square}$ 7 rectangle = 45

c) $10 + 7 = 17$

d) not enough information

e) $\int_{-7}^{-2} 7f(t+7)\,dt = 7\int_0^5 f(t)\,dt = 70$

(#9) a) No. We don't know specifics about the functions' behavior within the interval. All we know is the total integral. $f(t)$ does not necessarily $> g(t)$ at EVERY point.

b) Yes. Must exist. If $f(t)$ ~~was~~ was ALWAYS $< g(t)$, the integral could not exceed $\int g(t)$, as it does. Thus, $f(t) > g(t)$ for at least ~~some~~ some t.

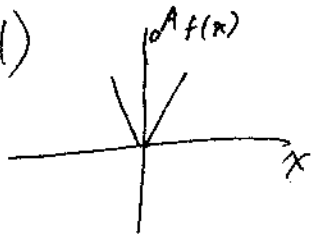
23.1

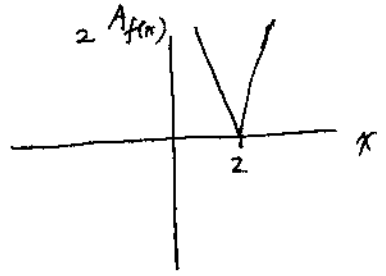
#1 a) $7x$; yes, it works for $x<0$

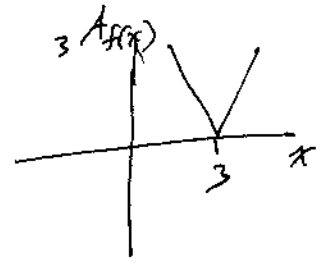
b) $7(x-2)$; yes, it works

c) $7(x-3)$; yes, it works

d)





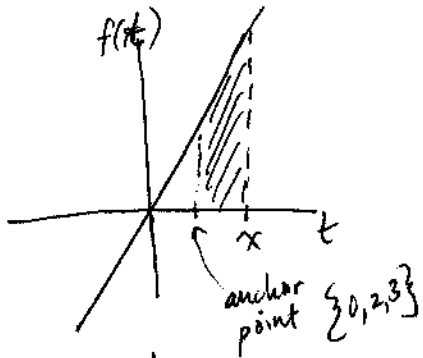


e) $\frac{d_0 A_{f(x)}}{dx} = \begin{cases} 7 \text{ for } x \geq 0 \\ -7 \text{ for } x < 0 \end{cases}$

$\frac{d_2 A_{f(x)}}{dx} = \begin{cases} 7 \text{ for } x > 2 \\ -7 \text{ for } x < 2 \end{cases}$

$\frac{d_3 A_{f(x)}}{dx} = \begin{cases} 7 \text{ for } x > 3 \\ -7 \text{ for } x < 3 \end{cases}$

#2

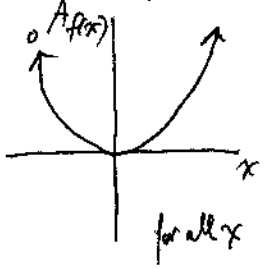


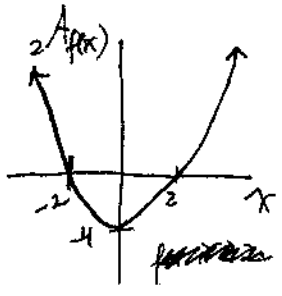
a) $\frac{x(2x)}{2} = x^2$; yes

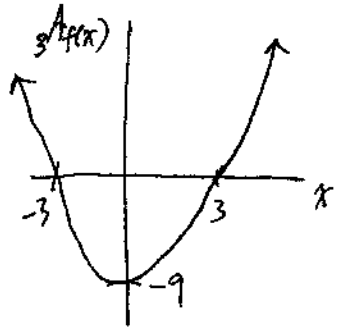
b) $4(x-2) + \frac{(x-2)(2x-4)}{2} = x^2 - 4$; yes $x \geq 2$

c) $6(x-3) + \frac{(x-3)(2x-6)}{2} = x^2 - 9$; yes for $x \geq 3$

d)







e) all derivatives $= 2x$

(#4) a) the amount of water in the tank in addition to the amount that was in there @ noon $= {}_0A_{f(x)}$

b) $[0, 20]$ ← in this interval, the rate is positive so water being added!

c) $t = 40$; ${}_0A_{f(40)} = 0$

23.2

(#1) a) ~~$[0, 8]$~~ $(0, 8)$

b) $(8, 11)$

c) 0

d) No

e) maximum @ $t = 8$

minimum @ $t = 0$