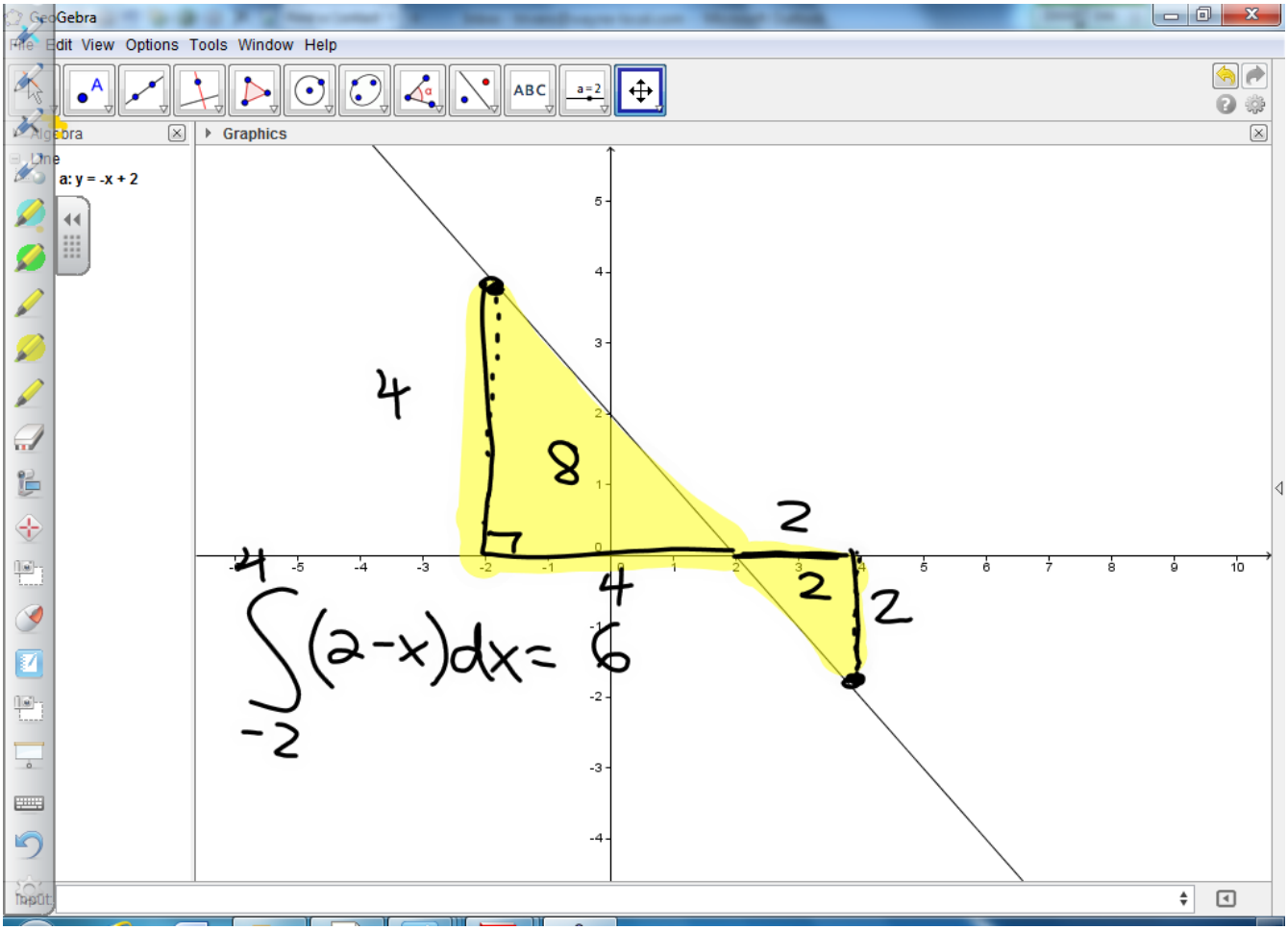
AP Calculus AB

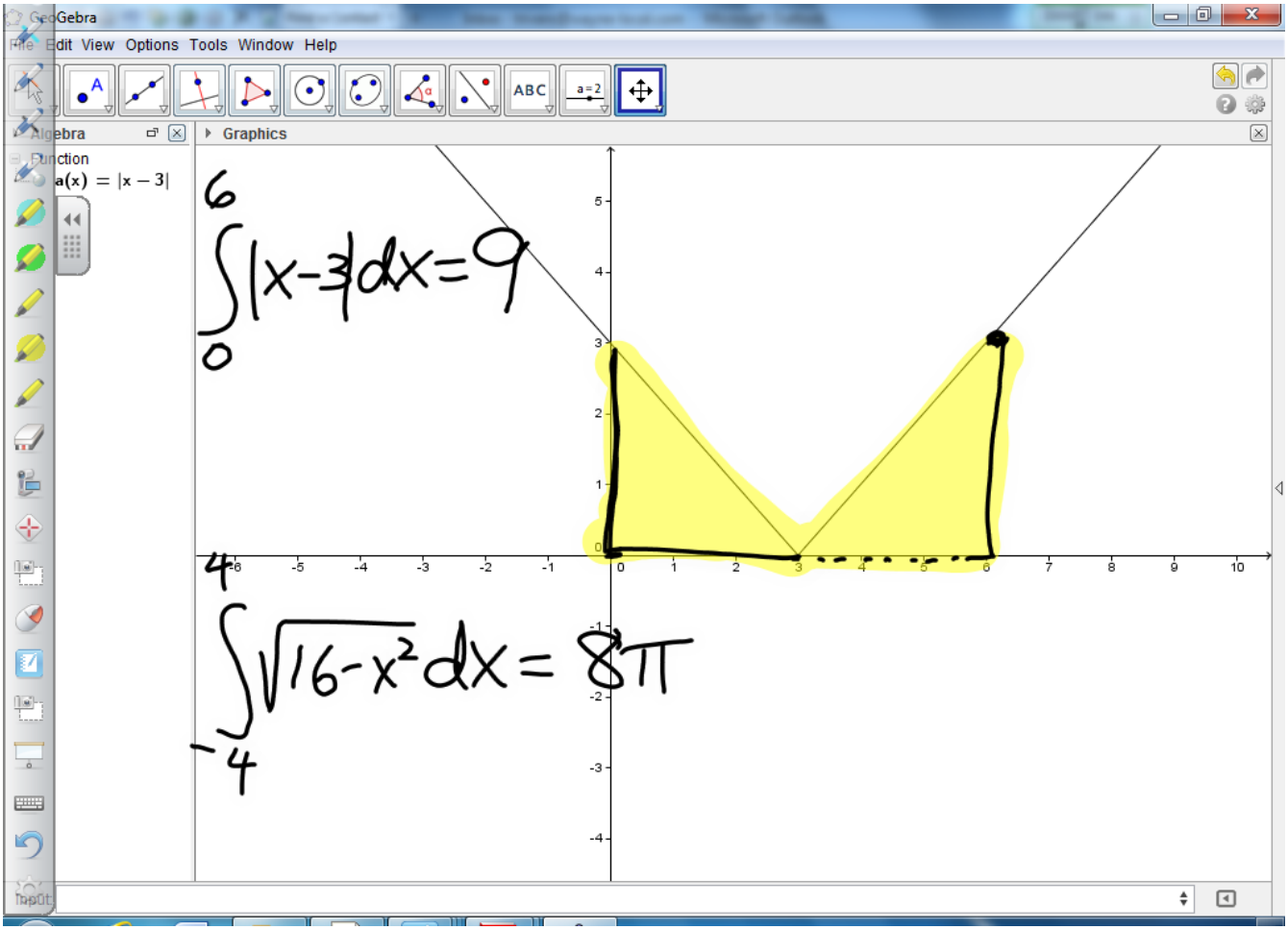
Monday, January 28, 2013

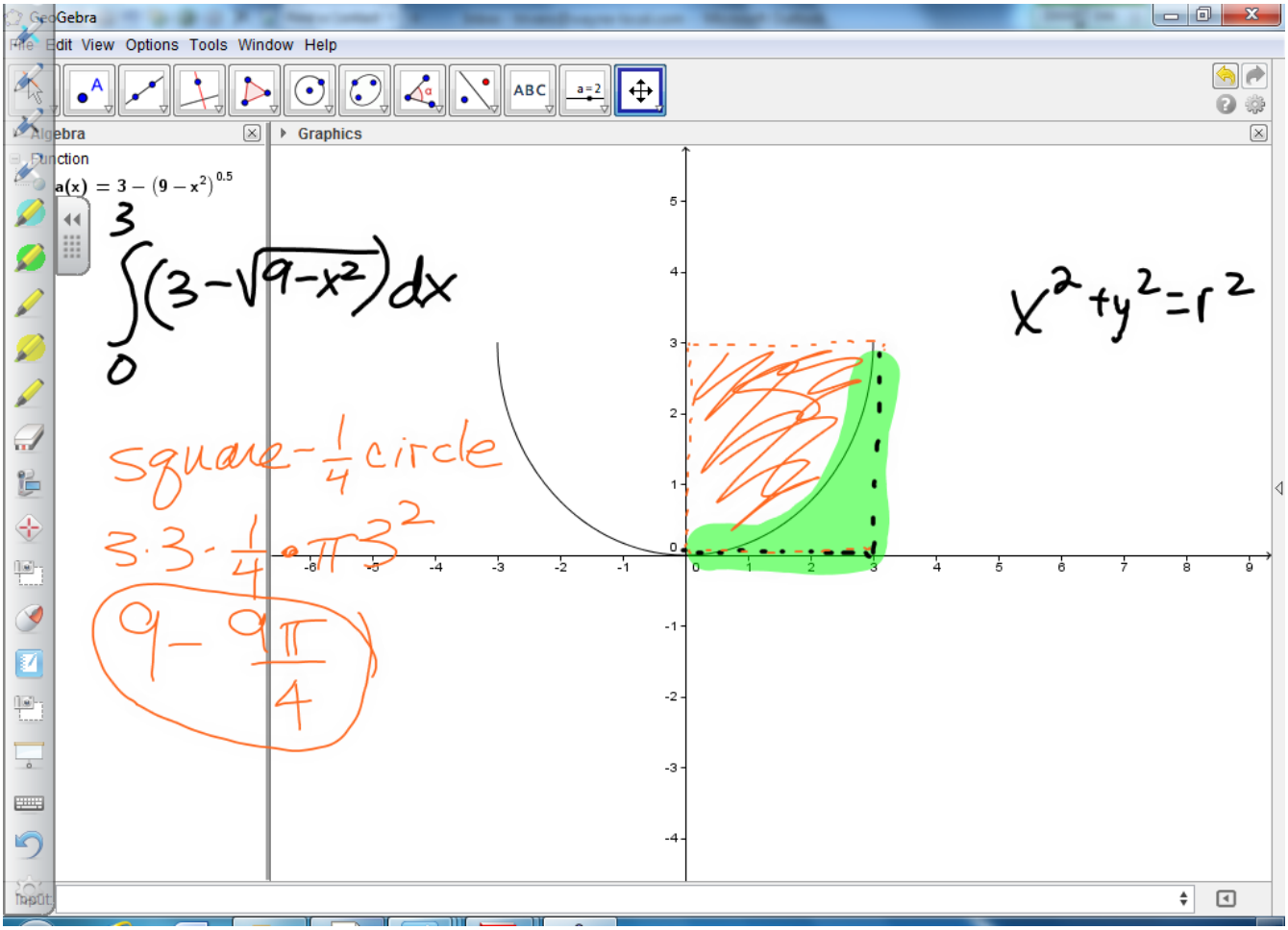
Please check HW answers with someone

Accumulation Function

No school for you Friday


GeoGebra
File Edit View Options Tools Window Help
Algebra
Line
a: y = -x + 2
Graphics
4
8
2
2
2
$\int_{-2}^{4}(2-x)dx = 6$


GeoGebra
File Edit View Options Tools Window Help
Algebra
Function
a(x) = |x − 3|
Graphics
$\int_0^6 |x-3|\,dx = 9$
$\int_{-4}^{4} \sqrt{16-x^2}\,dx = 8\pi$



EQN of Circle:

$(x-h)^2+(y-k)^2=r^2$

center: (h,k)

Radius $= r$

$x^2+y^2=9$

$y^2=9-x^2$

$y=\sqrt{9-x^2}$ → top ½

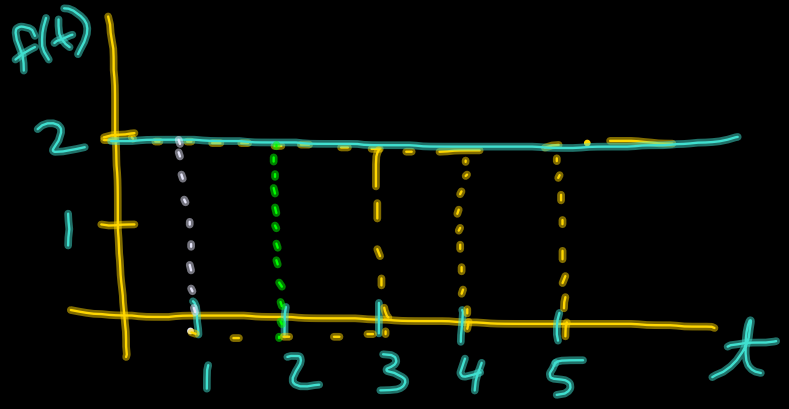
$y=-\sqrt{9-x^2}$ → bottom ½

Accumulation Function

We've been looking @ $\int_0^3 x\,dx$ → Definite Integral

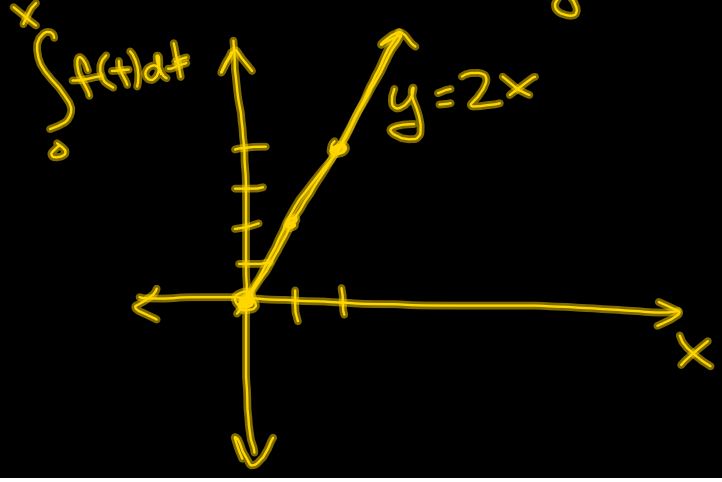
Area

$f(t)=2$

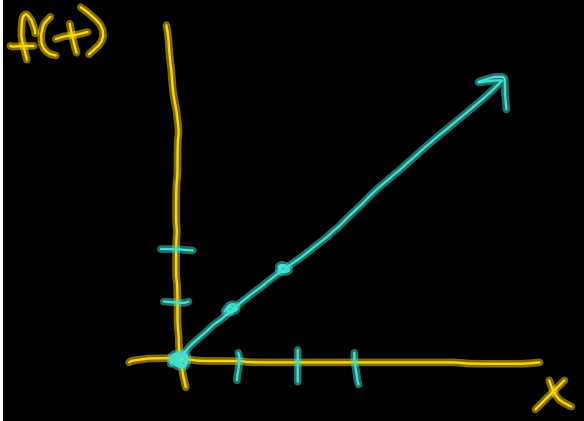


x	0	1	2	3	4	5
$\int_0^x f(t)\,dt$	0	2	4	6	8	10

Let's graph $\left(x, \int_0^x f(t)\,dt\right)$



$$\int_0^x t\,dt$$

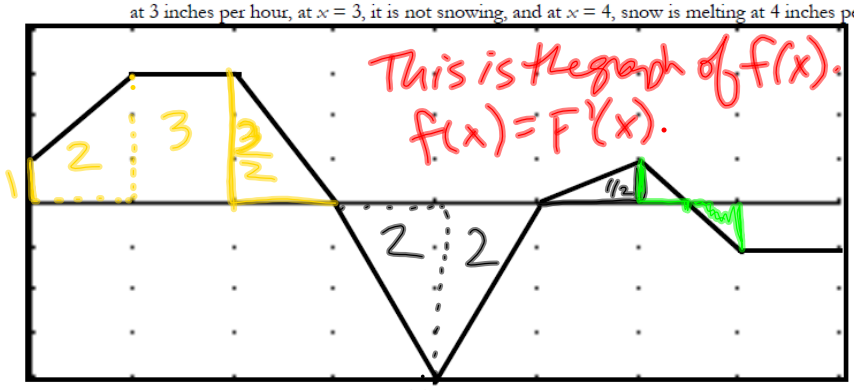


x	$\int_0^x t\,dt$
0	0/2
1	$\frac{1}{2}$
2	$\frac{4}{2}$
3	$\frac{9}{2}$
4	$\frac{16}{2}$
5	$\frac{25}{2}$

$$\frac{x^2}{2}$$

Example 1) Let $F(x) = \int_0^x f(t)\,dt$ where the graph of $f(x)$ is below. Remember $f(x)$ is the same thing as $f(t)$.

Think of $f(x)$ as the rate of snowfall over a period of time. For instance, at $x = 1$, snow is falling at 3 inches per hour, at $x = 3$, it is not snowing, and at $x = 4$, snow is melting at 4 inches per hour.



a. Complete the chart. In the snow analogy, $F(x)$ represents the accumulation of snow over time.

x	0	1	2	3	4	5	6	6.5	7	8
$F(x)$	0	2	5	$\frac{15}{2}$	$\frac{9}{2}$	$\frac{5}{2}$	3	13/4	3	2

$$F(x) = \int_0^x f(t)\,dt$$

$$F'(x) = \frac{d}{dx}\int_0^x f(t)\,dt$$

$$F'(x) = f(x)\,dx$$ ← Chain Rule

If $F'(x) > 0$, then $F(x)$ is increasing

$F(x)$ is increasing on $(0,3) \cup (5,6.5)$ because $F'(x)$ is positive on those intervals

$F(x)$ is decreasing on $(3,5) \cup (6.5,8)$ bc $F'(x) < 0$ on those intervals.