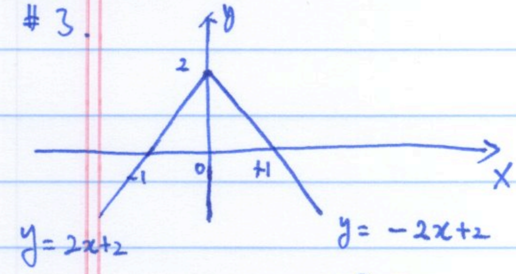
Midterm Exam I Solution

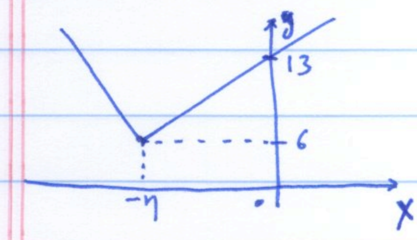
#1. Domain : $\{x \in \mathbb{R} : x \neq 0\}$
$= (-\infty, 0) \cup (0, \infty)$

#2. Domain : $\{x \in \mathbb{R} : x \geq 1\}$
$= [1, \infty)$.

#3.



#4.



#5. The line has slope m satisfying $m \cdot 2 = -1$. so $m = -\frac{1}{2}$.

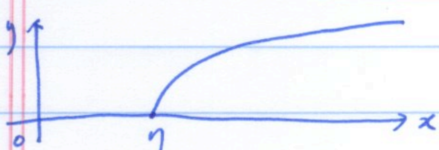
point : $(0,0)$
slope : $-\frac{1}{2}$ $\Rightarrow$ $y = -\frac{1}{2}x$.

#6. point: $(1,-1)$
slope: $-\frac{1}{3}$ $\Rightarrow$ $y-(-1) = -\frac{1}{3}(x-1)$

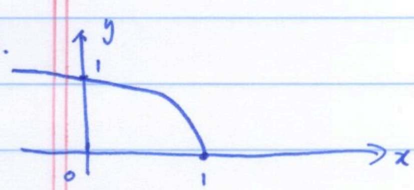
$y+1 = -\frac{1}{3}x + \frac{1}{3}$

$y = -\frac{1}{3}x - \frac{2}{3}$

#7.



#8.



#9. point : $(1,0)$
slope $= \frac{1-0}{0-1} = -1$ $\Rightarrow$ $y - 0 = -(x-1)$

$y = -x+1$

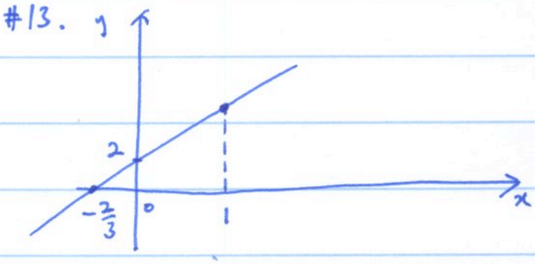
#10. point : $(2,1)$
slope $= \frac{5-1}{4-2} = 2$ $\Rightarrow$ $y-1 = 2(x-2)$

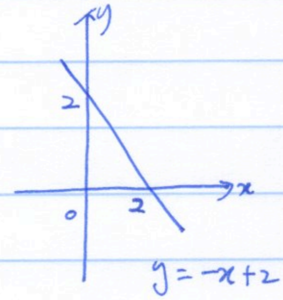
$y = 2x-3$

#11. $\frac{f(x+h)-f(x)}{h} = \frac{2(x+h)-1-(2x-1)}{h} = \frac{2h}{h} = 2$.

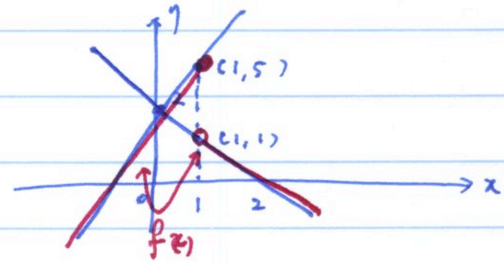
#12. $\frac{f(x+h)-f(x)}{h} = \frac{(x+h)^2-x^2}{h} = \frac{2xh+h^2}{h} = 2x+h$.

#13.

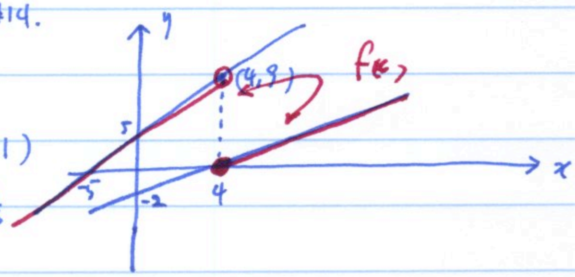




So the graph of $f(x)$ is :



#14.

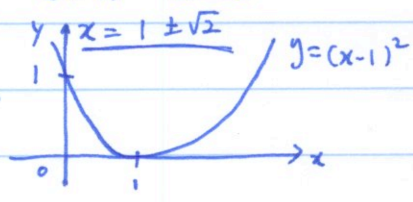


#15. $x^2 - 2x + 1 - 1 - 1 = 0$

$(x-1)^2 - 2 = 0$

$x = 1 \pm \sqrt{2}$

#16.



#17. $f \circ g(x) = f(g(x)) = 2(1-x)+1$
$= -2x+3$

#18. The equation of C : $(x-1)^2 + (y+1)^2 = r^2$

point $(-1,-1)$ $\Rightarrow$ $(-2)^2 + 0^2 = r^2$

$r = 2$. (Since r cannot be negative)