

(15) ① a) Find the domain of

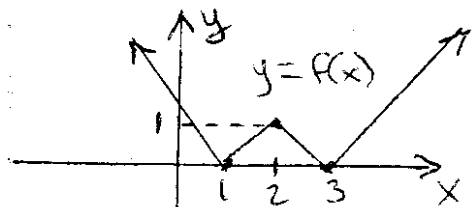
$$f(x) = \frac{2}{|3x-1|+1}$$

b) Find the x intercept(s)
of $f(x) = (2x-1)^{\frac{1}{2}} - 3$ c) Find the values of x
where the graph of
 $f(x) = |4x+1|$ lies below
the graph of $f(x) = 2$.(5) ② Let $f(x) = 3x^2 + 2x - 1$.Simplify $\frac{f(x+h) - f(x)}{h}$ (10) ③ a) Find the x intercept(s)
of

$$y = f(x) = \frac{x^2 - 1}{x^2 + 1}$$

b) For what value(s) of x
is $f(x) = \frac{1}{2}$?

(10) ④ a)

On what intervals is
 $y = f(x)$ decreasing?b) Is $y = f(x) = \frac{x^2 - 1}{x^2 + 1}$ even, odd, or neither?
Explain using functional
notation.(10) ⑤ a) Sketch $y = f(x) = \sqrt[3]{x}$.

b) Sketch

$$y = f(x) = \begin{cases} x+4 & \text{if } x < 1 \\ -2 & \text{if } x \geq 1 \end{cases}$$

(10) ⑥ a) Sketch

 $y = |x-1| + 1$. Include
intercepts & table of values.b) Sketch $y = \sqrt{x+4}$

Same directions as in a).

(5) ⑦ Express the distance,
d, from a point (x, y)
on the parabola
 $y = 7 - x^2$
to the point $(0, -2)$
as a function of x.

MAC 1105 EXAM III KEY (SU'09)

① a) $|3x-1|+1 \geq 1 > 0$

Domain: all reals

b) $(2x-1)^{1/2} - 3 = 0$
 $(2x-1)^{1/2} = 3$

Squaring $\Rightarrow 2x-1=9 \Rightarrow 2x=10$
 $x=5$

c) $|4x+1| < 2$
 $-2 < 4x+1 < 2$
 $-3 < 4x < 1$
 $-\frac{3}{4} < x < \frac{1}{4}$

② $3(x+h)^2 + 2(x+h) - 1 - (3x^2 + 2x - 1)$

$= \frac{3x^2 + 6xh + 3h^2 + 2x + 2h - 3x^2 - 2x}{h}$
 $= \frac{6xh + 3h^2 + 2h}{h}$
 $= h(6x + 3h + 2)$

③ a) $x^2 - 1 = 0 \Rightarrow x^2 = 1 \Rightarrow x = \pm 1$

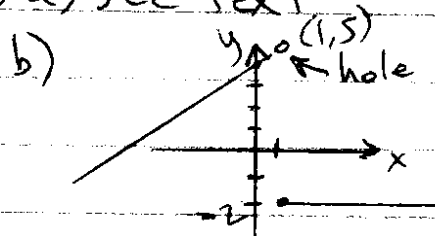
b) $\frac{x^2 - 1}{x^2 + 1} = \frac{1}{2}$
 $2(x^2 - 1) = x^2 + 1$
 $2x^2 - 2 = x^2 + 1$
 $x^2 = 3 \Rightarrow x = \pm \sqrt{3}$

④ a) $x \leq 1, 2 \leq x \leq 3$

b) $f(-x) = \frac{(-x)^2 - 1}{(-x)^2 + 1}$
 $= \frac{x^2 - 1}{x^2 + 1} = f(x)$

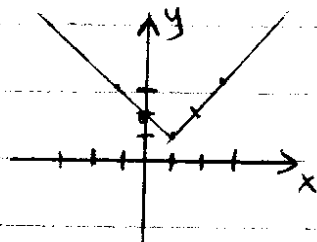
f is even.

⑤ a) see text



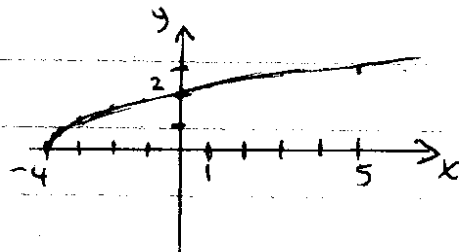
⑥ a)

x	y
-1	3
0	2
1	1
2	2
3	3



b)

x	y
-4	0
-3	1
0	2
5	3



⑦ $d = \sqrt{x^2 + (y+2)^2}$
 $= \sqrt{x^2 + (7-x^2+2)^2}$
 $= \sqrt{x^2 + (9-x^2)^2}$

OR
 $d = \sqrt{x^4 - 17x^2 + 81}$