1. Evaluate the following expressions:
   (a) $|-2|$,
   (b) $|7-2|$,
   (c) $|3-7|+|10-12|-11$.

2. Determine whether the following functions are odd, even or neither:
   (a) $f(x)=\sqrt{4-x^2}$,
   (b) $f(x)=\dfrac{1}{x^2+2}$,
   (c) $f(x)=\dfrac{x}{x^2+1}$,
   (d) $f(x)=3^x+x^2$.

3. Find the domain of
   (a) $\sqrt{1-x^2}$,
   (b) $\dfrac{1}{\sqrt{1-x^2}}$.

4. Solve for x :
   (a) $3-2x<17$,
   (b) $|x-6|\geq 10$,
   (c) $x^2-x-6>0$,
   (d) $\dfrac{2x-3}{x+1}\geq 1$.

5. (a) Sketch, on one pair of axes, the graphs of $y=|x|$ and $y=|x+5|$.
   (b) Use your graph to find the number of solutions to $|x|=|x+5|$.
   (c) Solve $|x|=|x+5|$

6. Sketch the following regions (use shading)
   (a) $x>y-2$,
   (b) $x^2+y^2\geq 4$ and $y>0$ and $y\leq x^2$.

7. Use your curve sketching menu to sketch the graph of $f(x)=\dfrac{1}{x^2-4}$. The menu is on the back of this sheet. Your sketch should take about half a page.

Solutions. 10.3.03.

1 (a) $|-2| = 2$ ✓

3. (b) $|7-2| = 5$ ✓

(c) $|3-7| + |10-12| - 11 = 4 + 2 - 11 = -5$ ✓

2. (a) $f(x) = \sqrt{4-x^2}$

$f(-x) = \sqrt{4-(-x)^2}$

$= \sqrt{4-x^2}$

$= f(x)$ ⟶ even ✓✓

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

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

$= \frac{1}{x^2+2}$

$= f(x)$ ⟶ even ✓✓

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

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

$= \frac{-x}{x^2-1}$

$= -f(x)$ ⟶ odd ✓✓

(d) $f(x) = 3^x + x^2$

$f(-x) = 3^{(-x)} + (-x)^2$

$= 3^{-x} + x^2$, not even nor odd. ✓✓

3. (a) $1-x^2 \geq 0$

4 $-1 \leq x \leq 1$ ✓✓

(b) $1-x^2 > 0$

$-1 < x < 1$ ✓✓

(4) (a) $3-2x < 17$

$-2x < 14$

12 $x > -7$ ✓✓

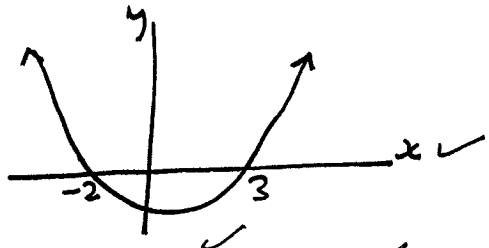
(b) $|x-6| \geq 10$

$x-6 \geq 10$ ✓ or $x-6 \leq -10$ ✓

$x \geq 16$ $x \leq -4$

(c) $x^2 - x - 6 > 0$

$(x-3)(x+2) > 0$ ✓



✓

$x < -2, \quad x > 3$ ✓

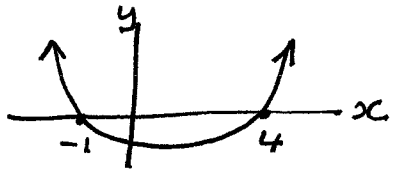
(d) $\frac{2x-3}{x+1} \geq 1$, note $x \neq -1$

$(2x-3)(x+1) \geq (x+1)^2$

$(2x-3)(x+1) - (x+1)^2 \geq 0$

$(x+1)[(2x-3) - (x+1)] \geq 0$

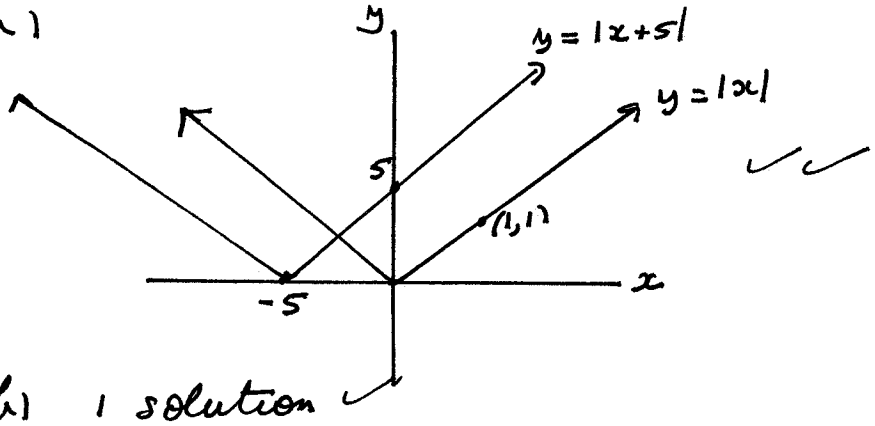
$(x+1)(x-4) \geq 0$



✓ ✓ ✓ ✓

$x \leq -1, \quad x \geq 4$

5. (a)



✓ ✓

(b) 1 solution ✓

(c) find pt of intersection, in quad 2.

solve $y = x+5$ and $y = -x$

$x + 5 = -x$

$2x = -5$

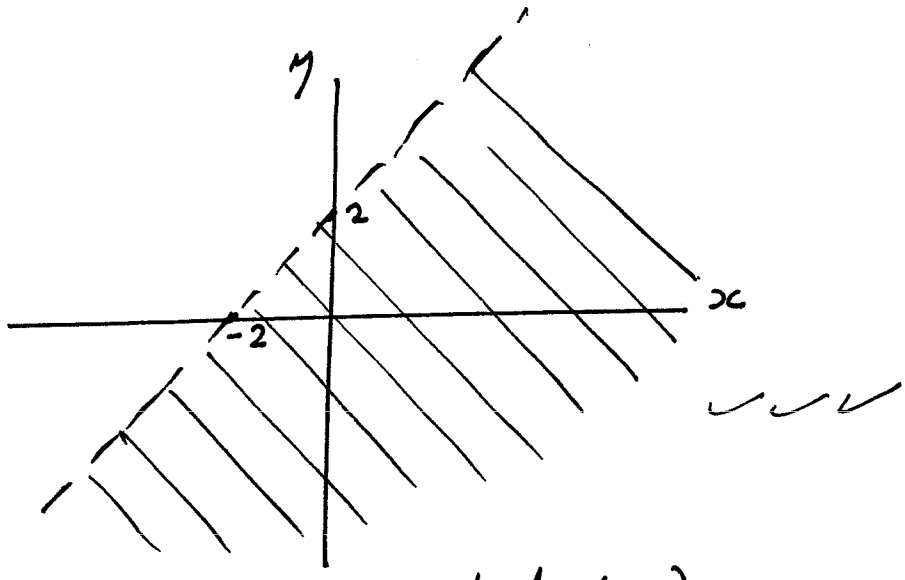
$x = -5/2$

$= -2\frac{1}{2}$

✓ ✓

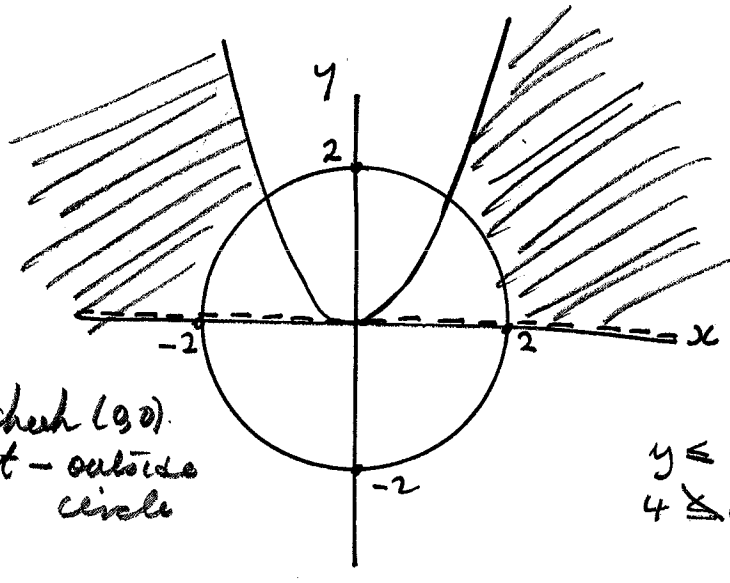
6.

(a)



sketch $y = x+2$, dot it. check $(0,0)$
$0 > 0-2$ ✓

(b)



$x^2+y^2 \geq 4$ check $(3,0)$
$0+0 \geq 4$ not – outside circle

$y \leq x^2$ check $(0,2)$
$4 \leq 0$ not – outside parabola

7. $y = \frac{1}{x^2-4} = \frac{1}{(x+2)(x-2)}$

6

Domain $x \neq 2, -2$

symmetry $f(x) = \frac{1}{x^2-4}$

$f(-x) = \frac{1}{(-x)^2-4}$

$= \frac{1}{x^2-4}$ → even

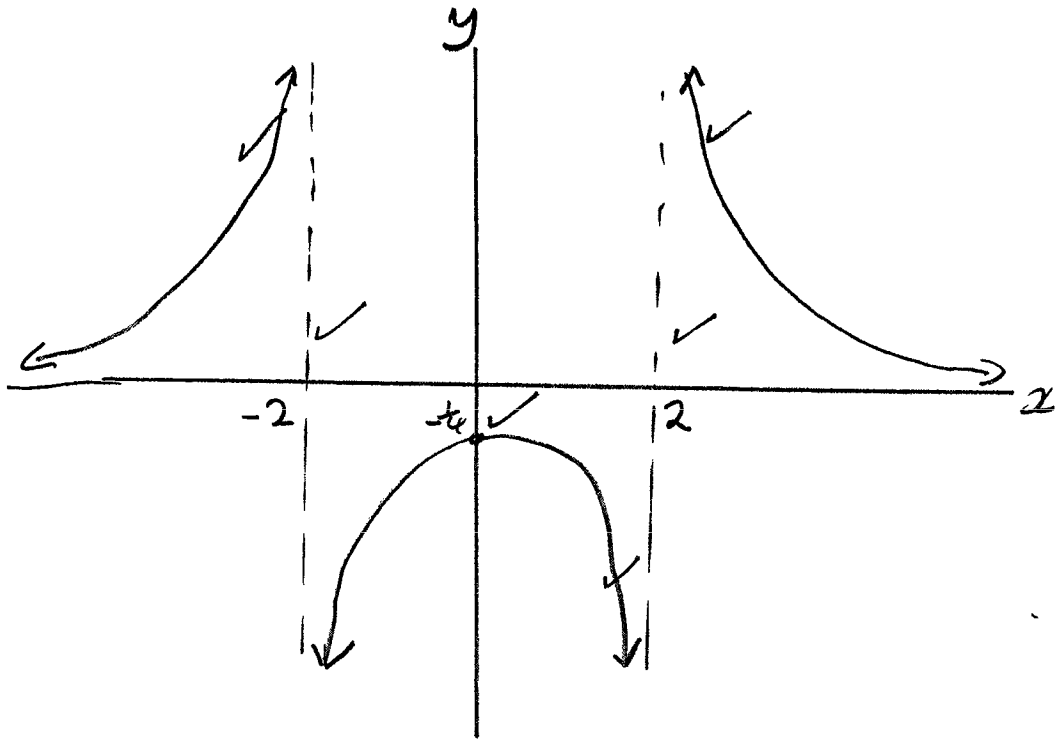
Intercepts y axis, $x=0$, $y = -\frac{1}{4}$.

x axis – no intercept

Asymptotes $x=2$ & $x-2$ – vertical

$y = \frac{1}{x^2-4} = \frac{\frac{1}{x^2}}{1-\frac{4}{x^2}}$ → 0 as $x \to 0$

so $y=0$, i.e. x axis, is horiz. asymp.



Signs $x < -2$, y is +ve

$-2 < x < 2$, y is -ve

$x > 2$, y is +ve