

1. (6pts) Let f be given by $f(x) = \frac{x^2 - x}{2x + 1}$. Find the following values for this function: $f(-1)$, $f(2t)$, $f(x+2)$. (Simplify where possible).

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

$$f(2t) = \frac{(2t)^2 - 2t}{2 \cdot 2t + 1} = \frac{4t^2 - 2t}{4t + 1}$$

$$f(x+2) = \frac{(x+2)^2 - (x+2)}{2(x+2) + 1} = \frac{x^2 + 4x + 4 - x - 2}{2x + 5} = \frac{x^2 + 3x + 2}{2x + 5}$$

2. (4pts) Find the domain of $f(x) = \sqrt{3 - 2x}$.

Must have $3 - 2x \geq 0$

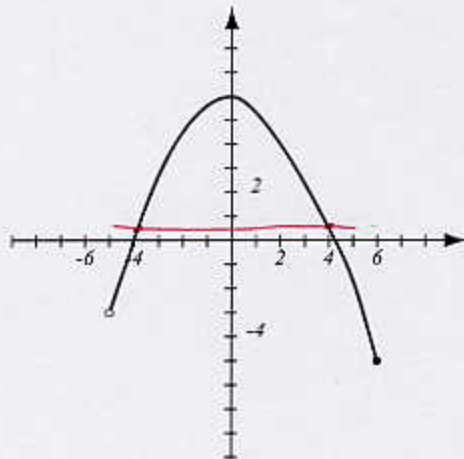
$$D = \{x \mid x \leq \frac{3}{2}\} = (-\infty, \frac{3}{2}]$$

$$3 \geq 2x + 2$$

$$\frac{3}{2} \geq x$$

3. (10pts) Use the graph of the function f at right to answer the following questions.

- What is the domain of f ?
- What is the range of f ?
- Find $f(6)$ and $f(4)$.
- List the x -intercepts of the graph.
- Where is the function increasing?
- What are the solutions of the equation $f(x) = 0.5$?



a) $\{x \mid -5 < x \leq 6\} = (-5, 6]$

b) $\{y \mid -5 \leq y \leq 6\} = [-5, 6]$

c) $f(6) = -5$, $f(4) = \frac{1}{2}$

d) $x = -4$, $x = 4.25$

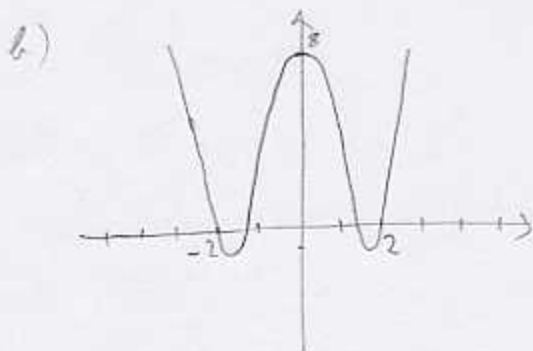
e) On $(-5, 0)$

f) $x = -3.8$, $x = 4$

4. (10pts) The function $f(x) = x^4 - 6x^2 + 8$ is given.

- Determine algebraically whether this function is even, odd or neither.
- Sketch the graph of f on paper. Why does your picture support what you found in a)?
- List the numbers where f has a local minimum. What are the local minima (i.e. the y -values)? Accuracy: 2 decimal points.
- List the intervals where f is increasing or decreasing.

a) $f(-x) = (-x)^4 - 6(-x)^2 + 8 = x^4 - 6x^2 + 8 = f(x)$ function is even



Graph is symmetric about y -axis
as an even function should be.

$[-5, 5] \times [-10, 10]$

c) f has a local min. at $x = -1.73$ with value $y = -1$
 $x = 1.73$ $y = -1$

d) f is increasing on $(-1.73, 0)$ and $(1.73, \infty)$
 f is decreasing on $(-\infty, -1.73)$ and $(0, 1.73)$