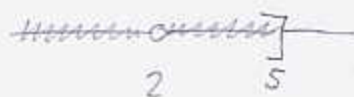


1. (5pts) Let f be given by $f(x) = (x^2 + x - 1)x$. Find the following values for this function: $f(-1)$, $f(3u)$, $f(x+4)$. (Simplify where possible).

$$\begin{aligned} f(-1) &= ((-1)^2 - 1 - 1)(-1) & f(3u) &= ((3u)^2 + 3u - 1) \cdot 3u & f(x+4) &= ((x+4)^2 + (x+4) - 1)(x+4) \\ &= (-1)(-1) & &= (9u^2 + 3u - 1)3u & &= (x^2 + 8x + 16 + x + 4 - 1)(x+4) \\ &= 1 & &= 27u^3 + 9u^2 - 3u & &= (x^2 + 9x + 19)(x+4) \\ & & & & &= x^3 + 9x^2 + 19x + 4x^2 + 36x + 76 \\ & & & & &= x^3 + 13x^2 + 55x + 76 \end{aligned}$$

2. (4pts) Find the domain of $f(x) = \frac{\sqrt{5-x}}{x-2}$.

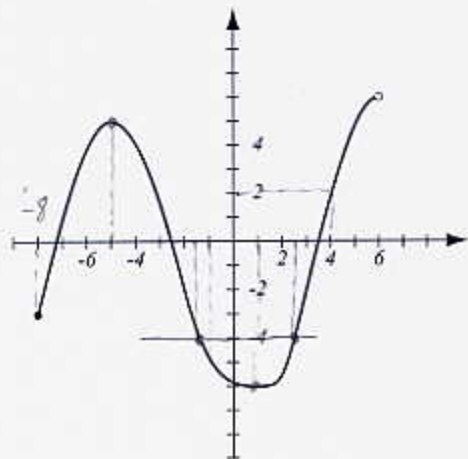
Must have $5-x \geq 0$ Can't have $x-2=0$
 $5 \geq x$ $x=2$



$$\{x \mid x \leq 5 \text{ and } x \neq 2\}$$

3. (9pts) Use the graph of the function f at right to answer the following questions.

- What is the domain of f ?
- Find $f(4)$ and $f(-1)$.
- List the x -intercepts of the graph.
- Where is the function decreasing?
- What are the solutions of the equation $f(x) = -4$?
- Where is $f(x) > 0$?



- $[-8, 6]$
- $f(4) = 2$, $f(-1) = -5$
- $x = -7.2, -2.5, 3.5$
- On $(-5, 1)$
- $x = -1.7, 2.5$
- On $(-7.2, -2.5)$ and $(3.5, 6)$

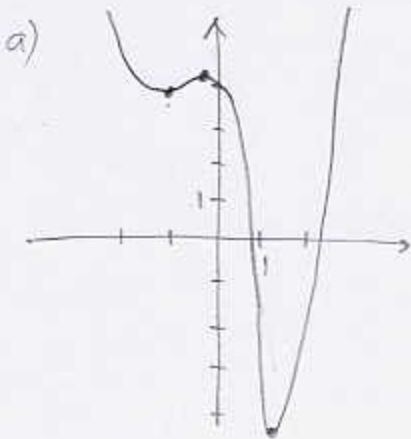
4. (8pts) The function $f(x) = x^4 - 4x^2 - 3x + 4$ is given.

a) Sketch the graph of f on paper.

b) List the numbers where f has a local minimum or maximum. What are the local minima (i.e. the y -values)? Accuracy: 3 decimal points.

c) List the intervals where f is increasing.

d) What is the range of this function?



b) f has a local min at $x = -1.164$ with value $y = 3.908$
and at $x = 1.574$ with value $y = -4.494$

f has a local max at $x = -0.405$
with value $y = 4.586$

c) f increasing on $(-1.164, -0.405)$
and $(1.574, \infty)$

d) Range = $[-4.494, \infty)$

5. (4pts) The function $f(x) = x^5 - 4x^3 + 7x$ is given.

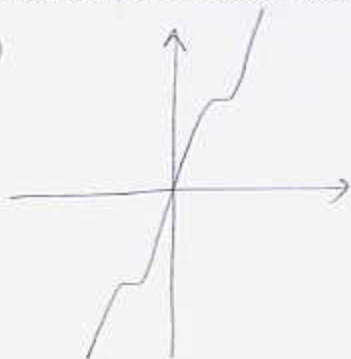
a) Determine algebraically whether this function is even, odd or neither.

b) Graph the function on paper. Does the graph support your conclusion from a) and why?

a) $f(-x) = (-x)^5 - 4(-x)^3 + 7(-x)$ b)

$$= -x^5 + 4x^3 - 7x = -f(x)$$

so f is an odd function



Graph is symmetric about the origin confirming that it is an odd function.