

1. (6pts) Let f be given by $f(x) = \frac{3x-5}{x^2+3x}$. Find the $f(3)$, $f(-x)$, $f(x+2)$ and (Simplify where possible).

$$f(3) = \frac{4}{18} = \frac{2}{9}$$

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

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

$$= \frac{3x+1}{x^2+4x+4+3x+6} = \frac{3x+1}{x^2+7x+10}$$

2. (4pts) Find the domain of $f(x) = \frac{x+1}{x^2+2x-15}$.

Can't have

$$x^2+2x-15=0$$

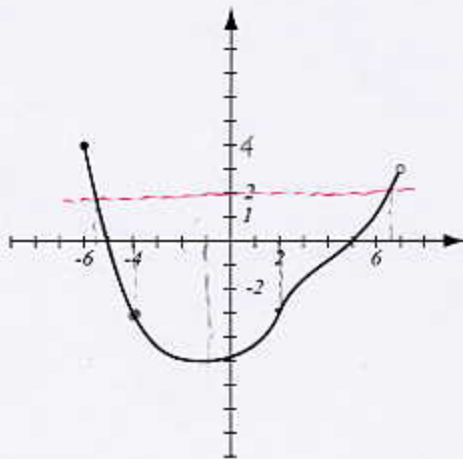
$$(x+5)(x-3)=0$$

$$x = -5, 3$$

$$D = \{x \mid x \neq -5, x \neq 3\}$$

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

- a) What is the domain of f ? $[-6, 7)$
- b) What is the range of f ? $[-5, 4]$
- c) Find $f(-4)$ and $f(2)$. $f(-4) = -3$, $f(2) = -3$
- d) List the x -intercepts of the graph. $-5, 5$
- e) Where is the function decreasing? on $[-6, -1)$
- f) What are the solutions of the equation $f(x) = 2$? $-5.5, 6.5$
- g) For which x is $f(x) > 0$? For $x \in [-6, -5)$ or $(5, 7)$



4. (10pts) The function $f(x) = x^3 - 7x$ is given.

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

b) Sketch the graph of f on paper. Why does your picture support what you found in a)?

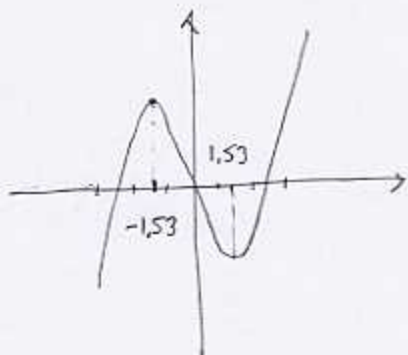
c) List the numbers where f has a local maximum. What are the local maxima (i.e. the y -values)? Accuracy: 2 decimal points.

d) List the intervals where f is increasing or decreasing.

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

Function is odd

b)



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

c) f has a local maximum at $x = -1.53$
whose value is 7.13

d) f is increasing on $(-\infty, -1.53)$ and $(1.53, \infty)$

f is decreasing on $(-1.53, 1.53)$