Fall '07/MAT 150/Worksheet 4 **Name:** Solution *Show all your work.*

1. (4pts) Let f be given by $f(x) = \dfrac{2x+3}{3x-7}$. Find the following for this function: $f(7t)$, $f(x-1)$. (Simplify where possible).

$f(7t) = \dfrac{2\cdot(7t)+3}{3\cdot(7t)-7} = \dfrac{14t+3}{21t-7}$

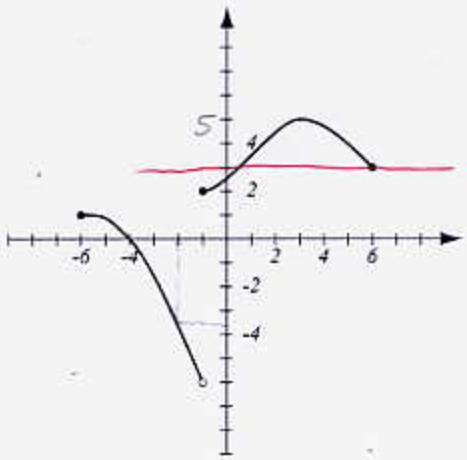
$f(x-1) = \dfrac{2(x-1)+3}{3(x-1)-7} = \dfrac{2x-2+3}{3x-3-7} = \dfrac{2x+1}{3x-10}$

2. (4pts) Find the domain of $f(x) = \dfrac{2x-5}{\sqrt{8-3x}}$.

Must have $8-3x \geq 0$
and $8-3x \neq 0$
thus $8-3x > 0$

$8-3x > 0$
$8 > 3x$
$\frac{8}{3} > x$

$D = (-\infty, \frac{8}{3})$

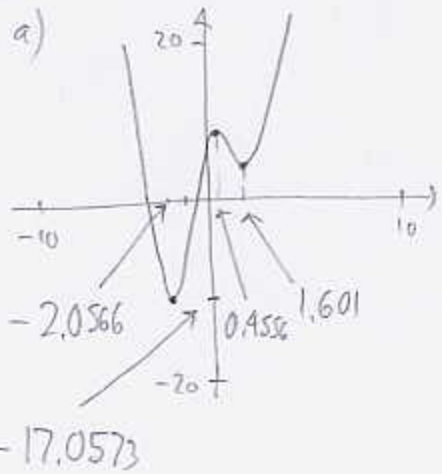


3. (9pts) Use the graph of the function f at right to answer the following questions.
a) What is the domain of f?
b) What is the range of f?
c) Find $f(3)$ and $f(-2)$.
d) Where is the function decreasing?
e) What are the solutions of the equation $f(x) = 3$?
f) Where is $f(x) < 0$?

a) $[-6, 6]$
b) $(-6, 1]$ and $[2, 5]$
c) $f(3) = 5$, $f(-2) = -3.5$
d) on $(-6, -1)$ and $(3, 6)$
e) $f(x) = 3$ for $x = 0.5$ and $x = 6$
f) On $(-4, -1)$

4. (9pts) The function $f(x) = x^4 - 7x^2 + 6x + 7$ 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 and maxima (i.e. the y-values)? Accuracy: 4 decimal points.
c) List the intervals where f is decreasing.
d) What is the range of this function?

a)



b) f has a local min at $x = -2.0566$ with value $y = -17.0573$
and $x = 1.601$ and $y = 5.2336$
f has a local max at $x = 0.4556$ with value $y = 8.3237$

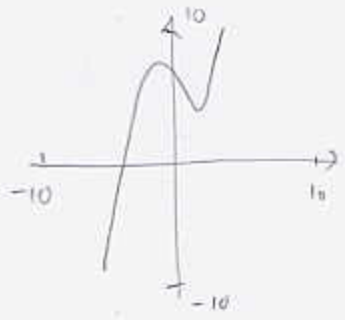
c) f is decreasing on $(-\infty, -2.0566)$
and $(0.4556, 1.601)$

d) The range is $[-17.0573, \infty)$

5. (4pts) The function $f(x) = x^3 - 3x + 7$ 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) $f(-x) = (-x)^3 - 3(-x) + 7 = -x^3 + 3x + 7 \neq f(x)$
$\neq -f(x)$ so neither

b)



The graph is neither symmetric wrt y-axis nor wrt the origin.