1. a) $\sqrt[3]{2t+4}$ is defined everywhere.

$2t^2-8=0$
$t^2-4=0$
$t=\pm 2$

$\Rightarrow$ not defined when $t=2$ or $t=-2$

$t=2$ or $t=-2$

$\therefore$ dom $f(t)=$ all t except $t=2$ or $t=-2$

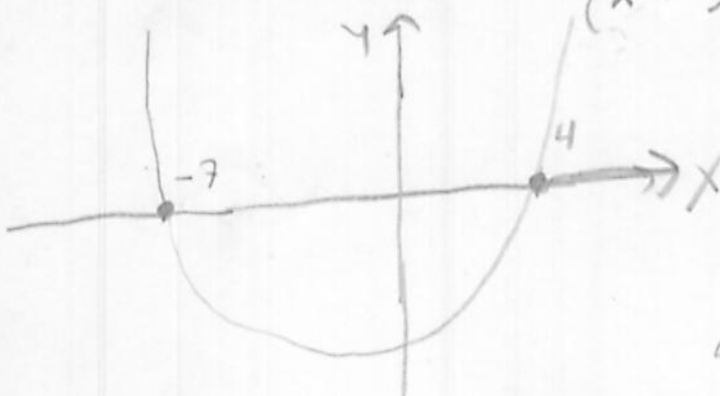
$\boxed{\text{dom} f(t) = (-\infty,-2)\cup(-2,2)\cup(2,+\infty)}$ ← final answer.

b) $7x^2+2x-4$ defined everywhere

$\sqrt{x^2+3x-28}$ is defined when $x^2+3x-28\geq 0$

$(x+7)(x-4)\geq 0$

so when $x\leq -7$ or $x\geq 4$



we cannot have $\sqrt{x^2+3x-28}=0$

so

dom $f(x)=$ set of x where $x<-7$ or $x>4$

$\boxed{\text{dom} f(x) = (-\infty,-7)\cup(4,+\infty)}$

2. a) 0 to 4:

$\dfrac{f(4)-f(0)}{4-0} = \dfrac{398.74-0}{4-0} = \dfrac{398.74}{4} = 99.69$

6 to 8:

$\dfrac{f(8)-f(6)}{8-6} = \dfrac{1182.32-657.86}{2} = \dfrac{524.46}{2} = 262.23$

b) $\underline{t=3}$: $\dfrac{f(4)-f(3)}{4-3} = \dfrac{398.74-275.65}{1}$

$= 123.09$

$\underline{t=6}$: $\dfrac{f(7)-f(6)}{7-6} = \dfrac{834.45-657.86}{1} = 176.59$

c) $\underline{t=3 \text{ to } t=5}$:

$\dfrac{f(5)-f(3)}{5-3} = \dfrac{521.30-275.65}{2} = \dfrac{245.65}{2} = \boxed{122.83}$

$\underline{t=6 \text{ to } t=8}$:

$\dfrac{f(8)-f(6)}{8-6} = \dfrac{1182.32-657.86}{2} = \dfrac{524.46}{2} = \boxed{262.23}$

bigger increase from 6 to 8

So more money raised between day 6 and 8.

$\underline{3.}$ a) $ARC = \dfrac{f(3)-f(-1)}{3-(-1)} = \dfrac{(1-12+27)-(1+4+3)}{4}$

$= \dfrac{16-8}{4} = \boxed{2}$

b) $\dfrac{f(-2+h)-f(-2)}{h} = \dfrac{(2(-2+h)^2-4(-2+h)+6)-(2(-2)^2-4(-2)+6)}{h}$

$= \dfrac{2(4-4h+h^2)+8-4h+6-(8+8+6)}{h} = \dfrac{-8h+2h^2-4h}{h}$

$= \dfrac{2h^2-12h}{h} = \boxed{2h-12}$

c) $\underline{x=-1.9}$: $h=0.1$ so $2(0.1)-12 = 0.2-12 = \boxed{-11.8}$

$\underline{x=-1.99}$: $h=0.01$ so $2(0.01)-12 = 0.02-12 = \boxed{-11.98}$

4. a)

x	$f(x) = x^2-3x+6$
2	4
1.5	3.75
1.1	3.91
1.01	3.9901
1.001	3.999001
1.0001	3.99990001

goes toward 4

$$\boxed{\lim_{x\to 1^+} f(x) = 4}$$

b)

x	$f(x) = 4x+1$
-2	-7
-1.5	-5
-1.1	-3.4
-1.01	-3.04
-1.001	-3.004
-1.0001	-3.0004

x	$x^2+1 = f(x)$
0	1
-0.5	1.25
-0.9	1.81
-0.99	1.9801
-0.999	1.998001

$\lim_{x\to -1^-} f(x) = -3$ $\quad \lim_{x\to -1^+} f(x) = 2$

$\lim_{x\to -1} f(x)$ doesn't exist as $\lim_{x\to -1^-} f(x) \neq \lim_{x\to -1^+} f(x)$.

5a) $\lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} 4x-1 = 3$

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

$\lim_{x\to 1} f(x)$ exists and is equal to 3. $f(1) = 3$

and $\lim_{x\to 1} f(x) = 3 = f(1)$. Hence continuous at $x=1$.

b) $\lim_{x\to -2^-} f(x) = \frac{-12}{-2} = 6$ $\quad \lim_{x\to -2^+} f(x) = 6$ $\quad f(-2) = \frac{-12}{-2} = 6$

$\therefore \boxed{\lim_{x\to -2} f(x) = 6 = f(-2)}$

so continuous at $x=-2$