A

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

a) $1-x \neq 0 \quad \wedge \quad -x^2+3x+10 \geq 0 \quad | \cdot (-1)$

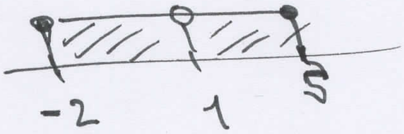
$x \neq 1$

$x^2-3x-10 \leq 0$

$(x-5)(x+2) \leq 0$

	$-\infty$	-2	5	$+\infty$
$x-5$	$-$	$-$	$+$	
$x+2$	$-$	$+$	$+$	
	$+$	$-$	$+$	

$x \in \langle -2, 5 \rangle$



$$\boxed{D_f = \langle -2, 1) \cup (1, 5 \rangle}$$

b) $f(x) = 0 \iff \sqrt{-x^2+3x+10} = 0 \iff -x^2+3x+10 = 0$

$\iff \underline{x=5} \vee \underline{x=-2}$

$\underline{x=0}: \ f(0) = \dfrac{\sqrt{10}}{1}$

$P_y = [0; \sqrt{10}]$, $P_{x_1} = [5; 0]$, $P_{x_2} = [-2; 0]$

c) $f(x) > 0 \quad \forall x \in (-2, 1)$

$f(x) < 0 \quad \forall x \in (1, 5)$

(2.) $$\lim_{n\to\infty}\frac{n^2-4n+5}{(n+3)^2-(n-3)^2}=\lim_{n\to\infty}\frac{n^2-4n+5}{n^2+6n+9-(n^2-6n+9)}$$

$$=\lim_{n\to\infty}\frac{n^2-4n+5}{12n}=\lim_{n\to\infty}\left(\frac{n}{12}-\frac{1}{3}+\frac{5}{12n}\right)=$$

$$=+\infty-\frac{1}{3}+0=\underline{\underline{+\infty}}$$

(3.) $$f(x)=\frac{-x+5}{x^2-5x+6}=\frac{5-x}{(x-3)(x-2)}$$

$x^2-5x+6\neq 0$

$(x-3)(x-2)\neq 0$

$\underline{x\neq 3}\ \wedge\ \underline{x\neq 2}$

$D_f=\mathbb{R}\setminus\{2;3\}$

$$\lim_{x\to 3_+}f(x)=\frac{2}{0_+\cdot 1}=\underline{\underline{+\infty}}$$

$$\lim_{x\to 3_-}f(x)=\frac{2}{0_-\cdot 1}=\underline{\underline{-\infty}}$$

$$\lim_{x\to 2_+}f(x)=\frac{3}{(-1)\cdot 0_+}=\underline{\underline{-\infty}}$$

$$\lim_{x\to 2_-}f(x)=\frac{3}{(-1)\cdot 0_-}=\underline{\underline{+\infty}}$$

$$\lim_{x\to\pm\infty}f(x)=\lim_{x\to\pm\infty}\frac{\cancel{x}\cdot\left(-1+\frac{5}{x}\right)}{x^{\cancel{2}}\cdot\left(1-\frac{5}{x}+\frac{6}{x^2}\right)}=\frac{1}{\infty}\cdot\frac{-1+0}{1-0+0}=\underline{\underline{0}}$$