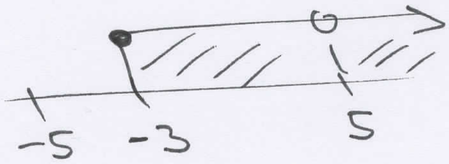
(c)

1. a) $f(x) = \dfrac{\sqrt{3+x}}{x^2-25}$

$3 + x \geq 0$ $\quad\wedge\quad$ $x^2 - 25 \neq 0$

$x \geq -3$ $\qquad (x+5)(x-5) \neq 0$

$x \neq \pm 5$

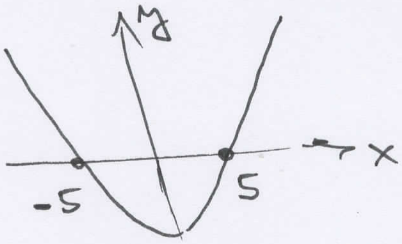


$$\boxed{D_f = \langle -3, 5) \cup (5, \infty)}$$

b) $f(x) = 0 \iff x = -3$ $\qquad P_x = [-3; 0]$

$f(0) = -\dfrac{\sqrt{3}}{25}$ $\qquad P_y = \left[0; -\dfrac{\sqrt{3}}{25}\right]$

c) $x^2 - 25 > 0 \iff x \in (-\infty, -5) \cup (5, \infty)$



$f(x) > 0 \quad \forall x \in (5, \infty)$

$f(x) < 0 \quad \forall x \in (-3, 5)$

(2.) $\lim\limits_{n\to\infty} \frac{3\cdot(2n+1)^2}{(3n+2)(1-2n)} = \lim\limits_{n\to\infty} \frac{\cancel{n^2}\cdot 3\cdot\left(\frac{1}{n}+2\right)^2}{\cancel{n^2}\cdot\left(3+\frac{2}{n}\right)\left(\frac{1}{n}-2\right)}$

$= \frac{3\cdot(0+2)^2}{(3+0)(0-2)} = \frac{3\cdot 4}{3\cdot(-2)} = \underline{\underline{-2}}$

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

a) $-x^2+3x \neq 0$

$x\cdot(-x+3) \neq 0$

$\underline{x\neq 0} \wedge \underline{x\neq 3} \Rightarrow \boxed{D_f = \mathbb{R}\setminus\{0;3\}}$

b) $\lim\limits_{x\to\pm\infty} \frac{3x-1}{-x^2+3x} = \lim\limits_{x\to\pm\infty} \frac{\cancel{x}\cdot\left(3-\frac{1}{x}\right)}{x^{\cancel{2}}\cdot\left(-1+\frac{3}{x}\right)} =$

$= \lim\limits_{x\to\pm\infty} \frac{1}{x}\cdot\frac{3-\frac{1}{x}}{-1+\frac{3}{x}} = 0\cdot\frac{3-0}{-1+0} = \underline{\underline{0}}$

$\lim\limits_{x\to 3_+} f(x) = \frac{8}{(-3)\cdot 0_+} = \underline{\underline{-\infty}}$

$\lim\limits_{x\to 3_-} f(x) = \frac{8}{(-3)\cdot 0_-} = \underline{\underline{+\infty}}$

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

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