UNIVERSIDAD DE SANTIAGO DE CHILE
DEPARTAMENTO DE MATEMÁTICA Y C.C
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CALCULO APLICADO
PRUEBA Nº 1
(Solución)

1.

1.a) Si

$$(\sqrt{a}-\sqrt{b})^2 \geq 0 \Rightarrow (a+b) \geq 2\sqrt{ab} \ / \sqrt{ab}$$

$$\Rightarrow \sqrt{ab}\,(a+b) \geq 2ab \ \therefore$$

$$\sqrt{ab} \geq \frac{2ab}{a+b}$$

$$\therefore a^4+b^4 \geq 2\sqrt{a^4b^4} \Rightarrow a^4+b^4 \geq 2a^2b^2$$

1b)

i)

$$\frac{x^2-2x+3}{x^2-5x+6} > \frac{1}{5} \Rightarrow \frac{x^2-2x+3}{x^2-5x+6} - \frac{1}{5} > 0 \Leftrightarrow \frac{(4x^2-5x+9)>0}{5(x^2-5x+6)} > 0$$

$$\Rightarrow (x^2-5x+6) > 0 \Leftrightarrow (x-3)(x-2) > 0 \Rightarrow Si(-\infty,2) \cup (3,\infty)$$

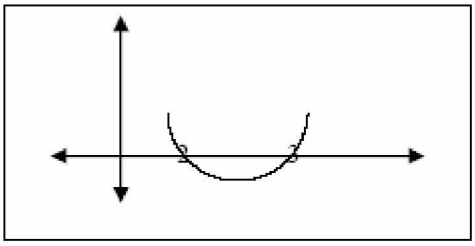
ii

$$\frac{x^2-2x+3}{x^2-5x+6} < \frac{-1}{5} \Rightarrow \frac{x^2-2x+3}{x^2-5x+6} + \frac{1}{5} < 0 \Leftrightarrow \frac{6x^2-15x+21}{5(x-3)(x-2)} < 0$$

$$\wedge 6x^2-15x+21 > 0$$

$$\Rightarrow (x-3)(x-2) < 0 \Rightarrow Sii = (2,3)$$

$$St = Si \cup Sii = \Re - \{2,3\}$$

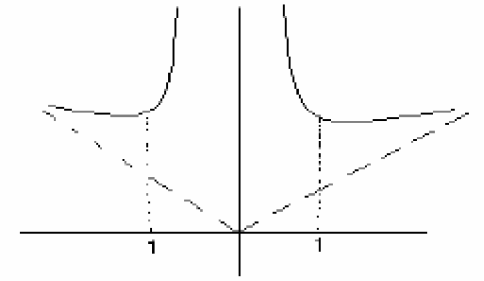


2.

$f(x) = |x| + \frac{1}{x^2}$; $y - f(-x) = |x| + \frac{1}{x^2}$ es par

asíntotas $y = x$;

$x = 0$



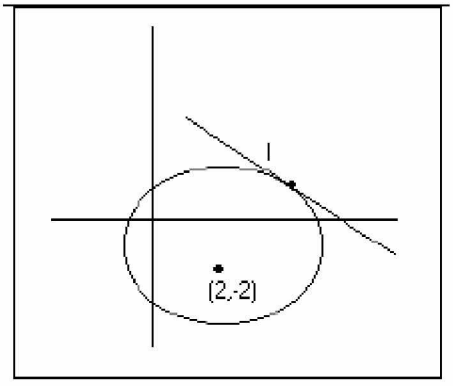
3.

$$(x-2)^2 + (y+2)^2 = r^2$$

$$l : x - y + 4 = 0$$

$$r = d(c,l) = \frac{|2+2+4|}{\sqrt{2}} = 4\sqrt{2}$$

$$\therefore (x-2)^2 + (y+2)^2 = 32$$



4.

$$a)\frac{1+\cos\alpha+\cos\frac{\alpha}{2}}{sen\alpha+sen\frac{\alpha}{2}}=\frac{2\cos^2\frac{\alpha}{2}+\cos\frac{\alpha}{2}}{2sen\frac{\alpha}{2}\cos\frac{\alpha}{2}+sen\frac{\alpha}{2}}=\frac{\cos\frac{\alpha}{2}}{sen\frac{\alpha}{2}}*\frac{\cos\frac{\alpha}{2}+1}{\cos\frac{\alpha}{2}+1}=\cot g\frac{\alpha}{2}$$

$$b)2sen\,\alpha\,\cos\,\alpha\,=1+\cos^{\,2}\alpha\,-sen^{\,2}\alpha\,=2\cos^{\,2}\alpha$$

$$\cos\,\alpha\,(sen\,\alpha\,-\cos\,\alpha\,)=0\Rightarrow\,\cos\,\alpha\,=0\Rightarrow\,\alpha\,=(2k-1)\frac{\pi}{2}+2k\pi$$

$$sen\,\alpha\,-\cos\,\alpha\,=0\Rightarrow\,tg\,\alpha\,=1$$

$$\therefore\,\alpha\,=\frac{\pi}{4}+k\pi$$

$$\therefore\,\alpha\,=3k\pi\,-\frac{\pi}{2}\wedge\alpha\,=\frac{\pi}{4}+k\pi$$