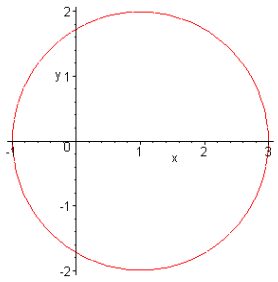
Convergence for Bateman forms.doc PhL 3.26.05

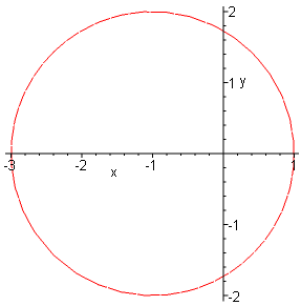
Condition for convergence is what is stated to the right. So "inside" means the form converges inside the figure drawn. The left equation number is for P, the right for Q.

I made these plots like this:

```
z := x+I*y;
implicitplot(abs(   (1-z)/2  ) = 1, x=-4..4,y=-4..4 , scaling = CONSTRAINED, grid = [100,100]);
```



(1-z)/2	(14) (32)	inside	
2/(1-z)	(19) (37)	outside	

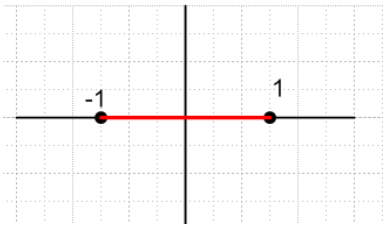


(1+z)/2	(15) (33)	inside	
2/(1+z)	(18) (36)	outside	



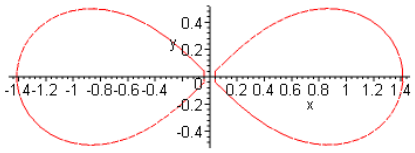
(z-1)/(z+1)	(16) (34)	right	try z = 1
(z+1)/(z-1)	(17) (35)	left	

Note added: $|z-1| = |z+1|$ defines the imaginary axis so the above is correct,

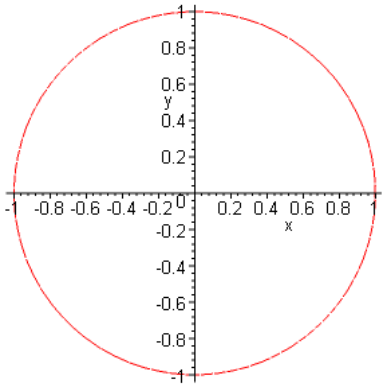


$(z-\sqrt{z^2-1})/(z+\sqrt{z^2-1})$	(27) (45)	try z = 2
$(z+\sqrt{z^2-1})/(z-\sqrt{z^2-1})$	(31) (49)	

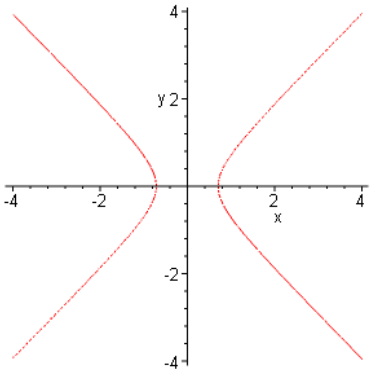
Note added: Plot for the above cases was done wrong. Let $z = ch\xi$ to find that ratio = $e^{-2\xi}$. Then you need that $|e^{-2\xi}| = 1$ which means $\xi = i\theta$ which means $z = ch(\xi) = \cos\theta$ which lies on -1 to 1. I gave up on what the "sides are" in this case. If you want to pursue that topic, see "convergence of Bateman forms. mws" .



$1-z^2$	(20) (38)	inside
$1/(1-z^2)$	(21) (39)	outside

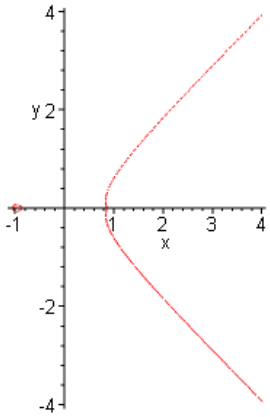


z^2	(22) (40)	inside
$1/z^2$	(23) (41)	outside

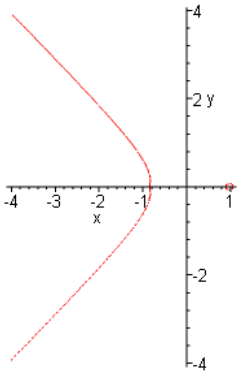


$1-1/z^2$	(24) (42)	left/right	try $z = \pm 2$
$z^2/(z^2-1)$	(25) (43)	middle	try $z = 0$

The real intersection is $1/\sqrt{2} = .707$.



$[(2\sqrt{z^2-1}) /(z+\sqrt{z^2-1})]$	(28) (46)	right and z=-1	try z = 0 =>div
$[(z+\sqrt{z^2-1}) /(2\sqrt{z^2-1})]$	(30) (48)	left	



$(-z+\sqrt{z^2-1}) /[2\sqrt{z^2-1})]$	(26) (44)	right	try z = 0
$(2\sqrt{z^2-1}) /(-z+\sqrt{z^2-1})]$	(29) (47)	left and z = 1	try z=0