Eccentricity (see text p. 639-640)

eccentricity describes the "shape" of a conic

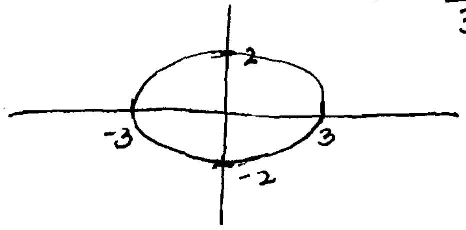
for ellipses & hyperbolas, $e = \frac{c}{a}$. $(c>0, a>0)$

Ellipses

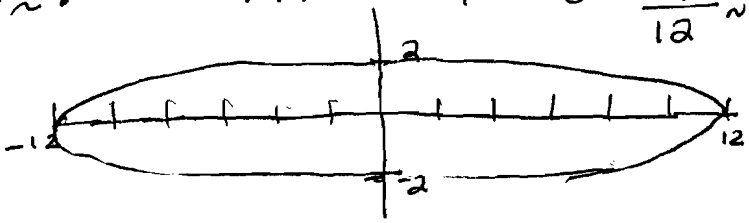
$e = \frac{c}{a}$, $0 < e < 1$

more circular (near 0) more oval (near 1)

$\frac{x^2}{9} + \frac{y^2}{4} = 1$ $\quad e = \frac{\sqrt{5}}{3} \approx .7$



$\frac{x^2}{144} + \frac{y^2}{4} = 1$ $\quad e = \frac{\sqrt{140}}{12} \approx .99$



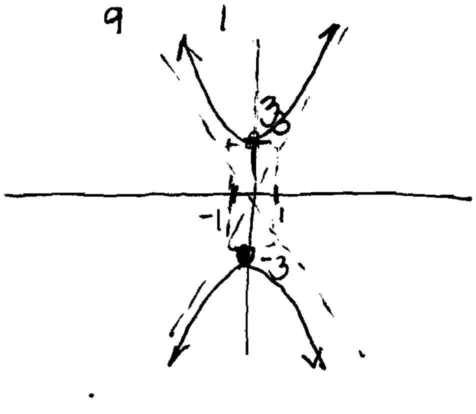
If we treat a circle like an ellipse, its equation could be $\frac{x^2}{a^2} + \frac{y^2}{a^2} = 1$. Therefore $e = \frac{0}{a} = 0$.

So the eccentricity of a circle is 0!

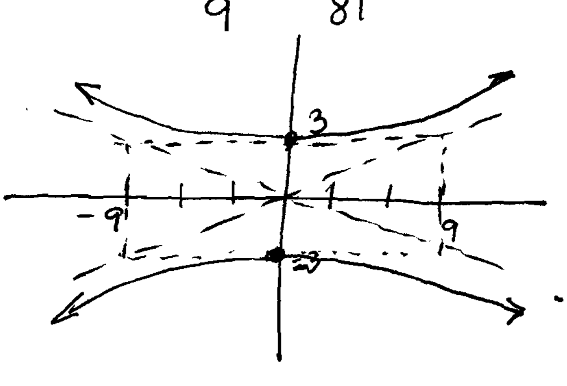
Hyperbolas

$e = \frac{c}{a}$, $e > 1$ (as e increases, branches widen)

$\frac{y^2}{9} - \frac{x^2}{1} = 1$ $\quad e = \frac{\sqrt{10}}{3} \approx 1.1$

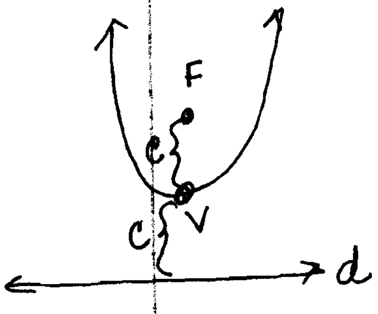


$\frac{y^2}{9} - \frac{x^2}{81} = 1$ $\quad e = \frac{\sqrt{90}}{3} \approx 3.2$



Parabolas

eccentricity $= \dfrac{\text{distance from focus to any pt. on parabola}}{\text{distance from that same pt. to the directrix}}$



$= \dfrac{c}{c}$

$= 1$

In summary:

eccentricity	$e = 0$	circle	
	$e = 1$	parabola	
	$0 < e < 1$	ellipse,	$e = c/a$
	$e > 1$	hyperbola,	$e = c/a$