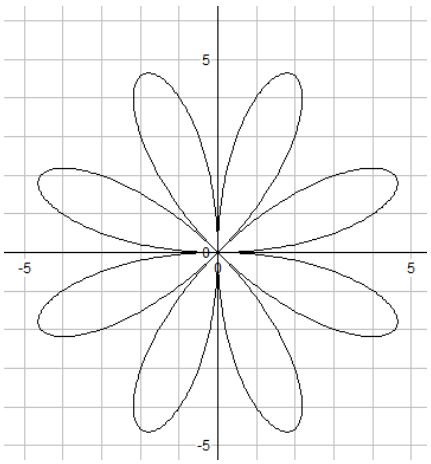
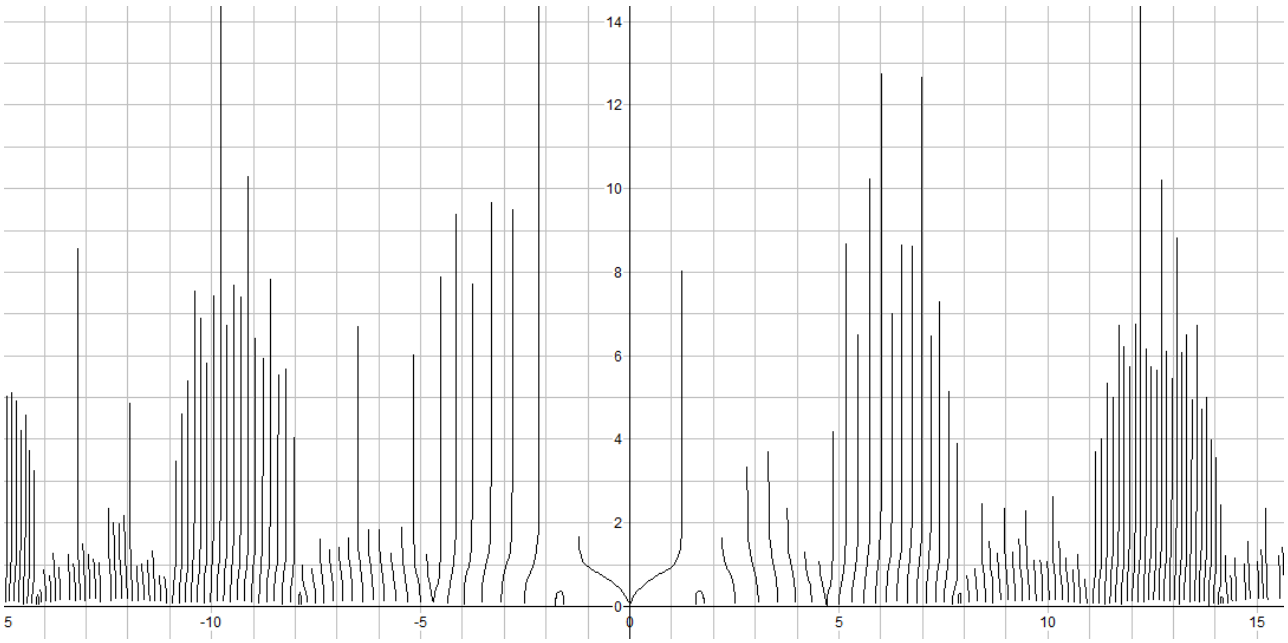
A Picture is Worth A Thousand Exercises
Colin Foster



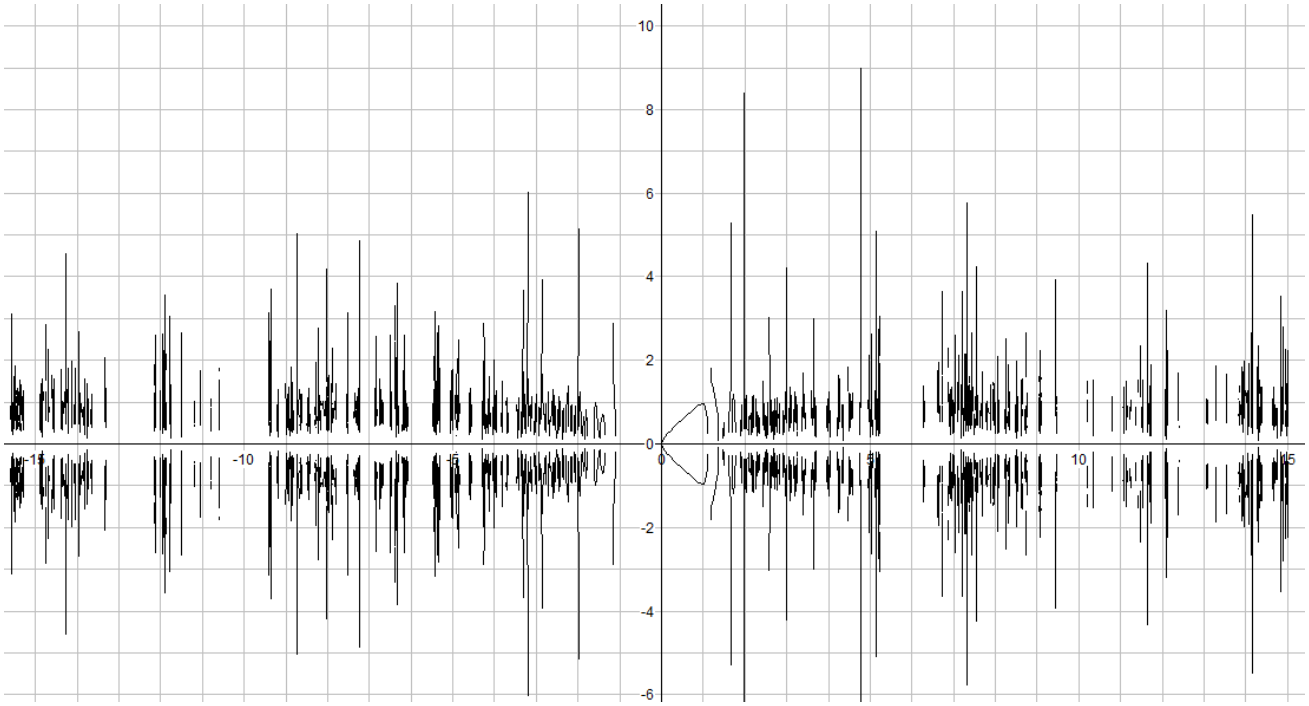
Flower

$r = 10\cos 2\theta \sin 2\theta$ for 1 rev



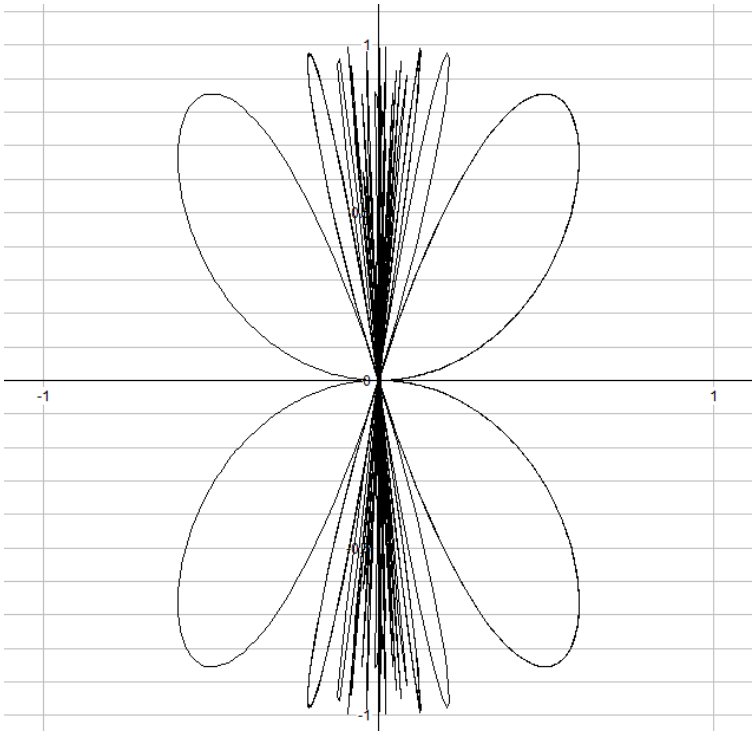
Forest

$y = (\tan x^2 \cos x)^{0.3}$



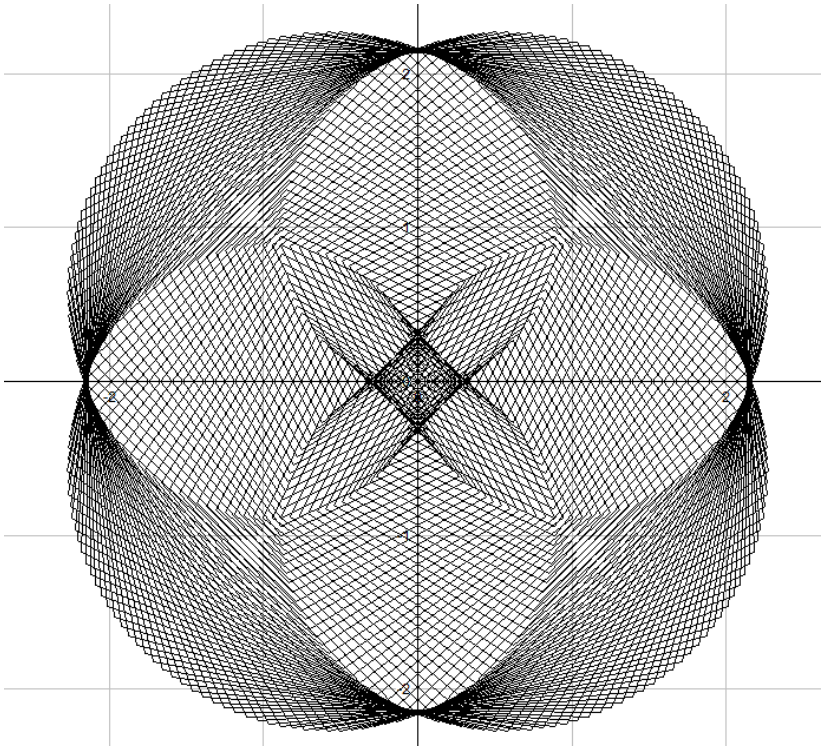
A calm still lake

$y^4 = \tan x^3 \cos x^5$



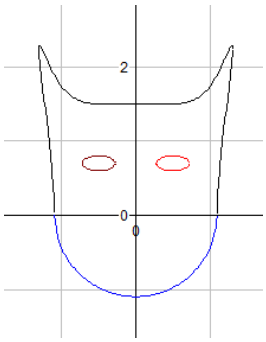
Butterfly

$r = \sin(\tan\theta)$ for 1.5 revs



An insect's eye

$r = 5\cos\frac{\theta}{3}\sin\frac{\theta}{3}$ for 665 revs



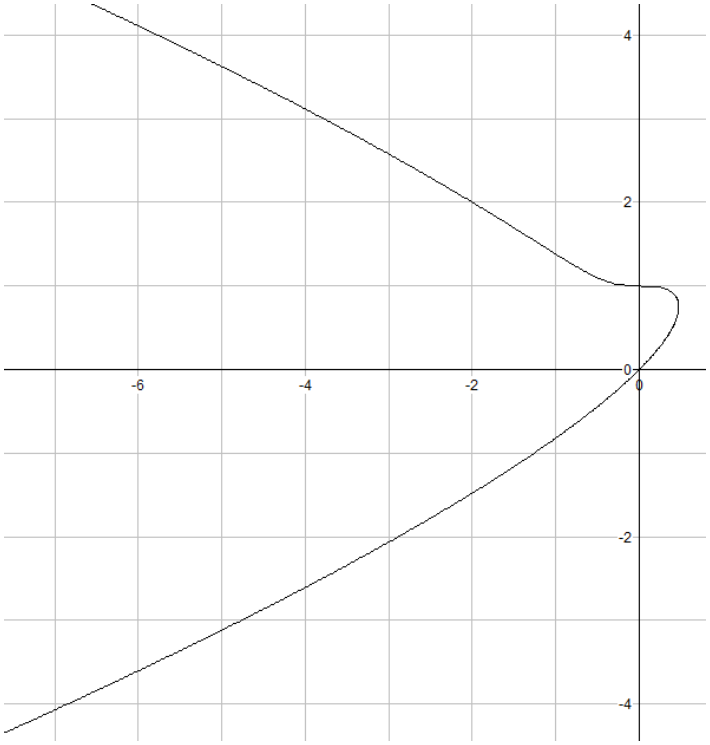
Cat

$y = \sqrt{x^6 \pm \sqrt{5 - x^6}}$

$y = -\sqrt{1.2 - x^2}$

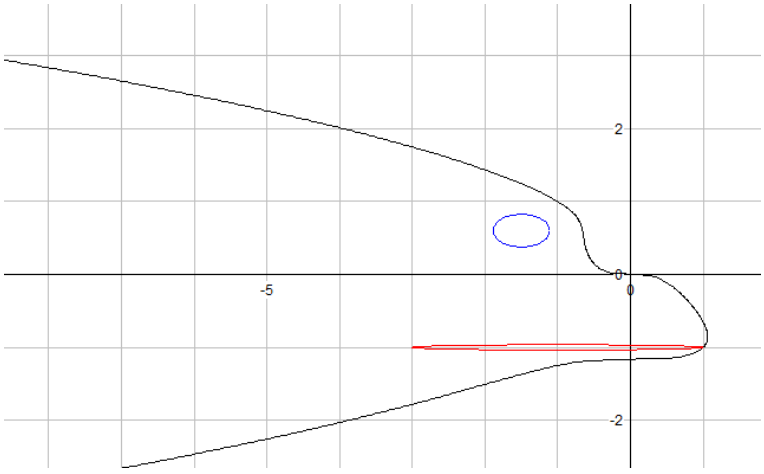
$(x - 0.5)^2 + 5(y - 0.7)^2 = 0.05$

$(x + 0.5)^2 + 5(y - 0.7)^2 = 0.05$



Beak

$y^3 = x^3 + y^4$

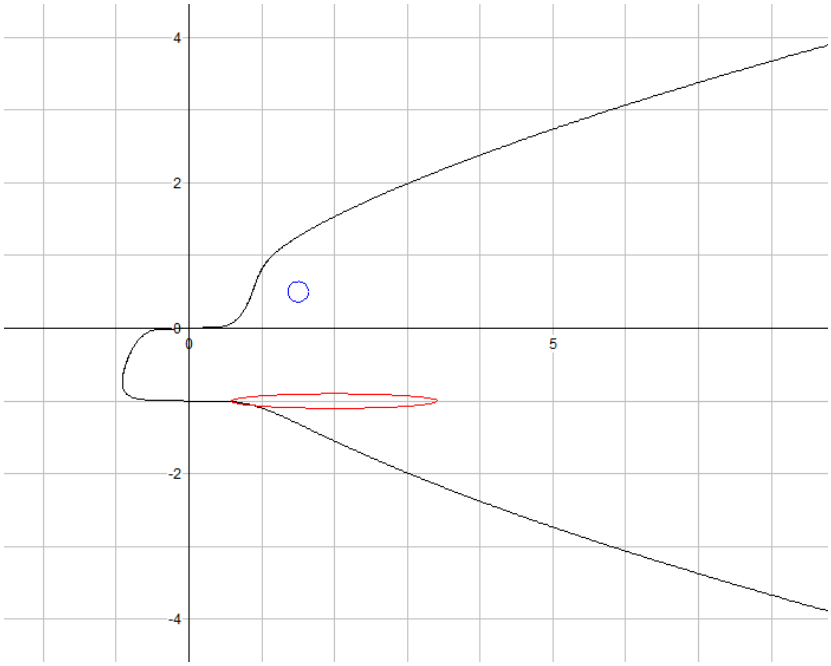


Bird

$y^2 = y + x^3 + y^6$

$(x+1.5)^2 + 3(y-0.6)^2 = 0.15$

$(x+1)^2 + 3000(y+1)^2 = 4$

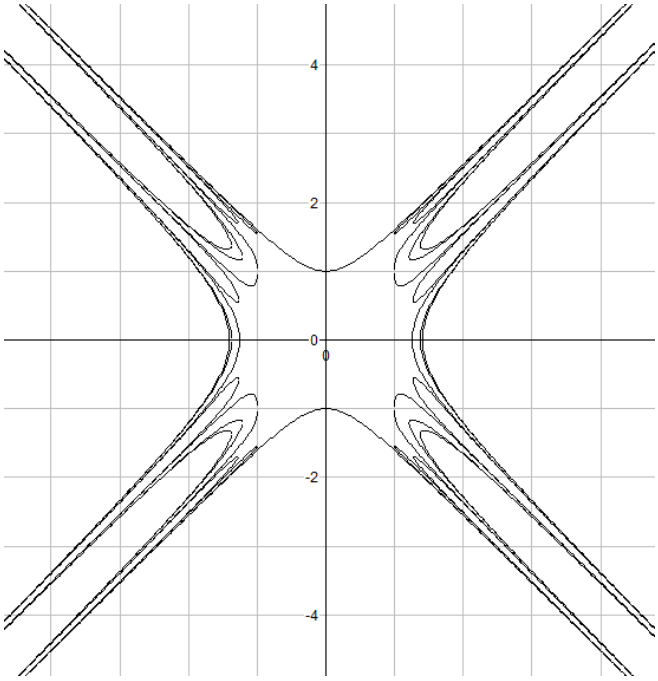


Dolphin

$y = x^5 - y^8$

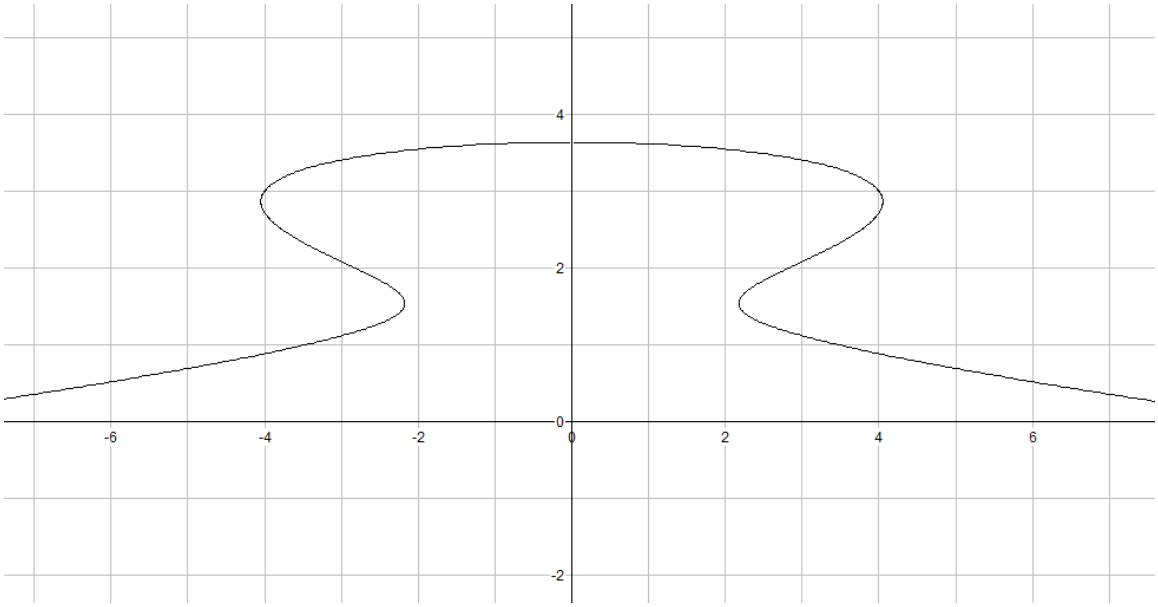
$(x-1.5)^2 + (y-0.5)^2 = 0.02$

$0.005(x-2)^2 + (y+1)^2 = 0.01$



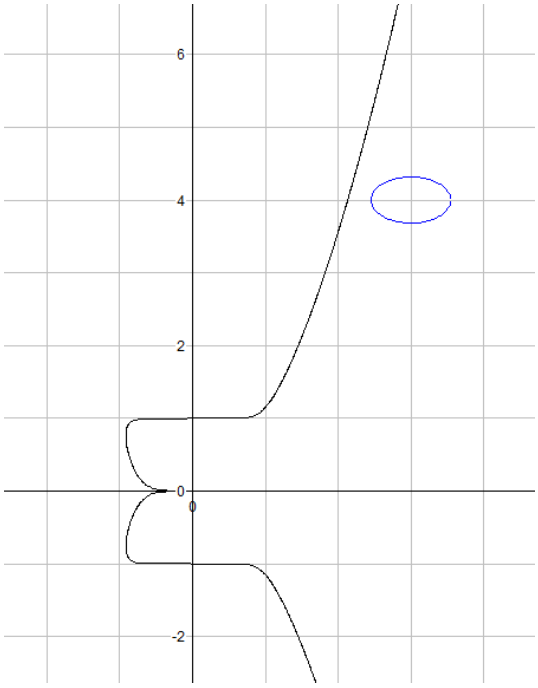
Spiky monster

$y = \pm\sqrt{x^2 \pm \sqrt{x^2 \pm \sqrt{x^2 \pm \sqrt{x^2 \pm 1}}}}$



Alien head

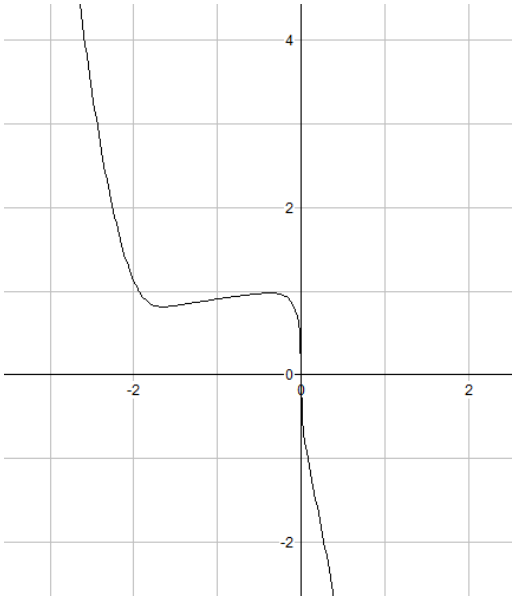
$x^2 + 11(y-2)^3 = y^3$



Kiss

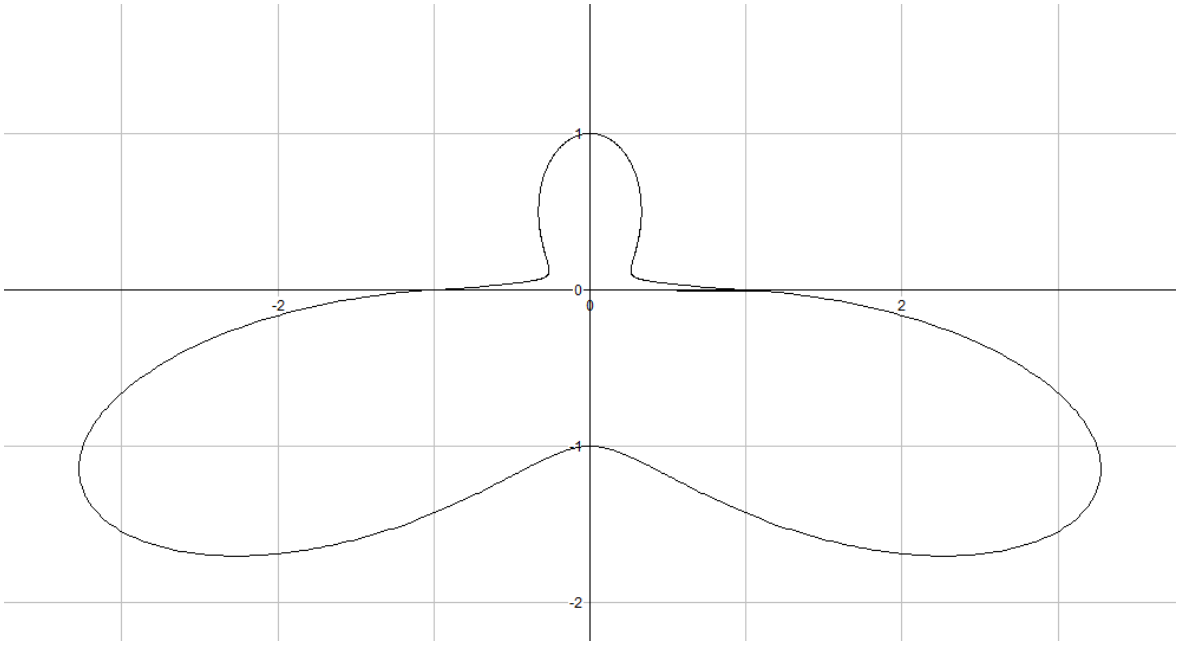
$y^6 = x^{11} + y^2$

$(x-3)^2 + 3(y-4)^2 = 0.3$



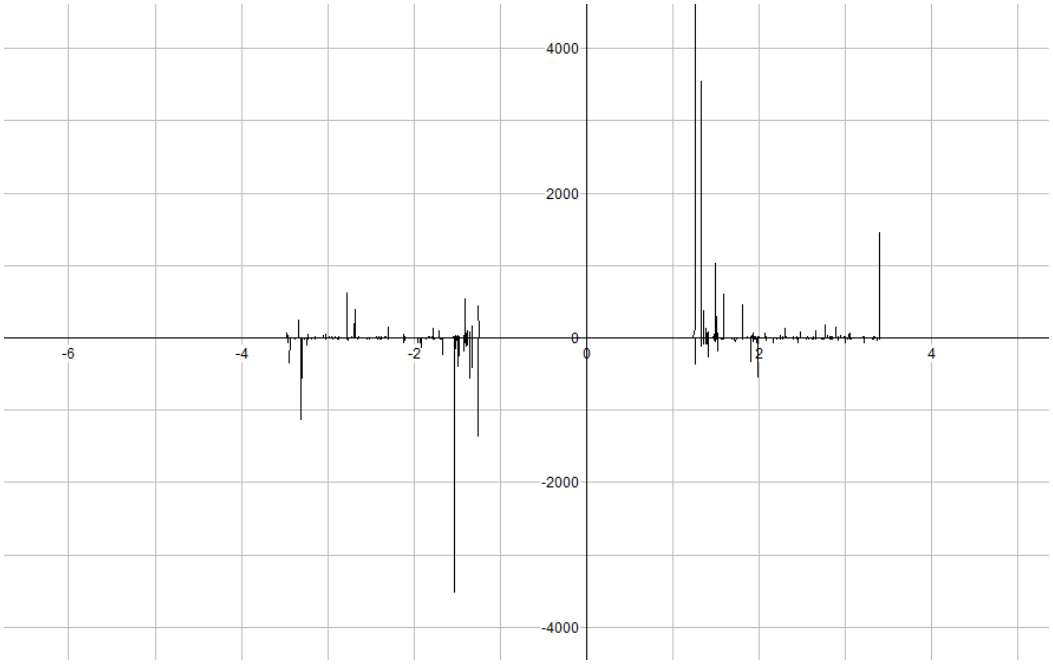
Chin

$$(x+1)^9 + y^3 = \frac{3}{x^2+3}$$



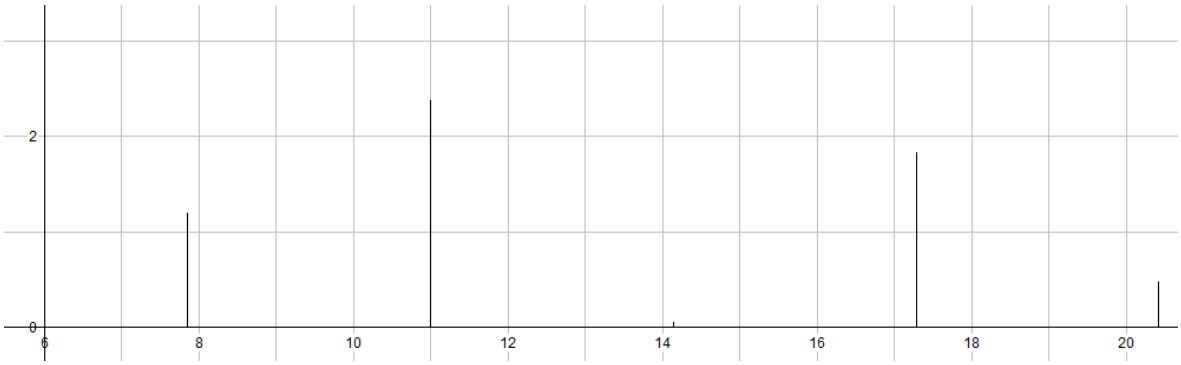
Sixth-formers' favourite

$r = (\sin\theta\cos\theta\tan\theta)^{1.7\sin\theta}$ for 1 rev



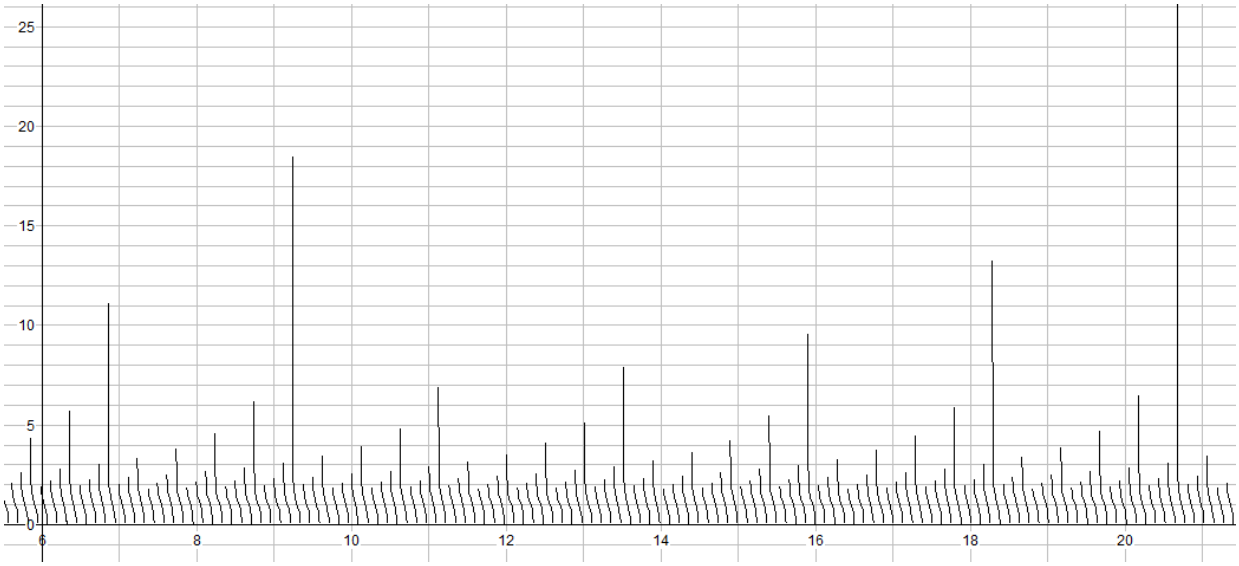
‘Like an NMR spectrum in science’

$\tan x^{20}$



‘Like a vertical line graph’

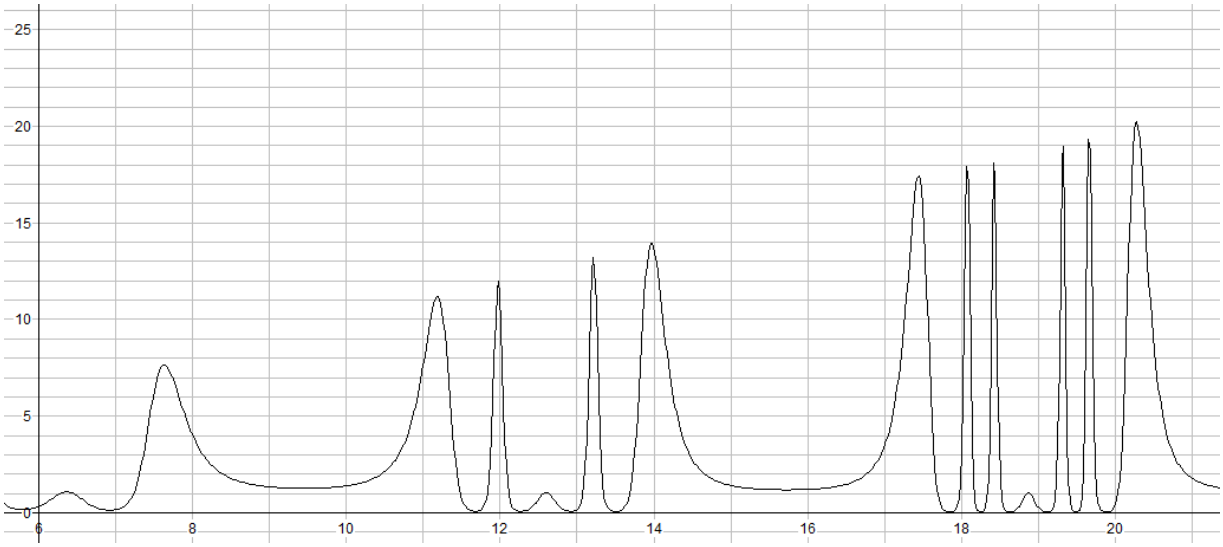
$\sqrt{y} = \sin x + 3\tan x$



‘Like a statistics graph’

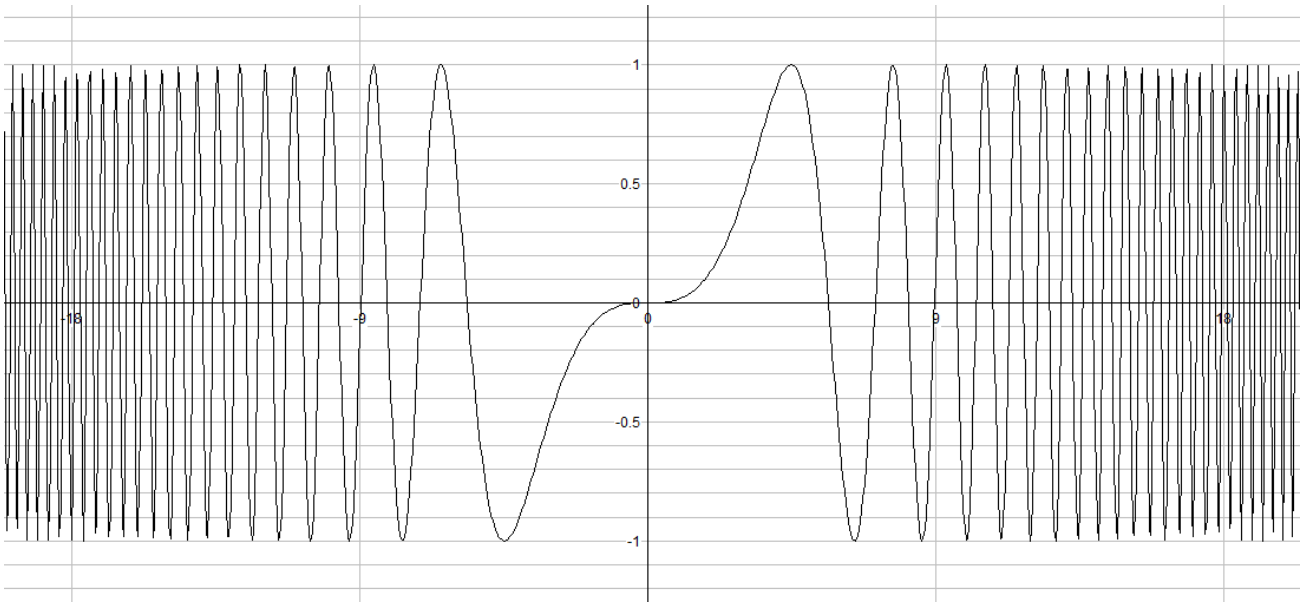
$y = \sqrt{1 - \tan 25x}$

What determines where the bigger peaks come?



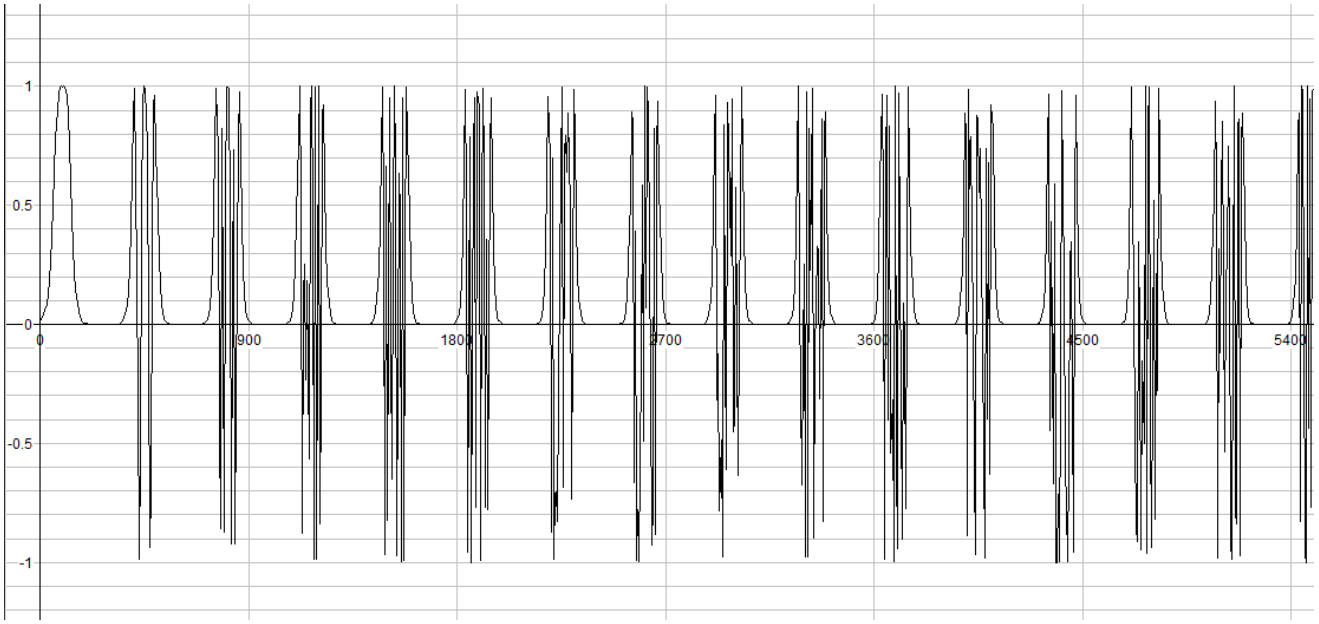
Wavy scientific graph

$y = x^{(\sin x)^{\cos x}}$



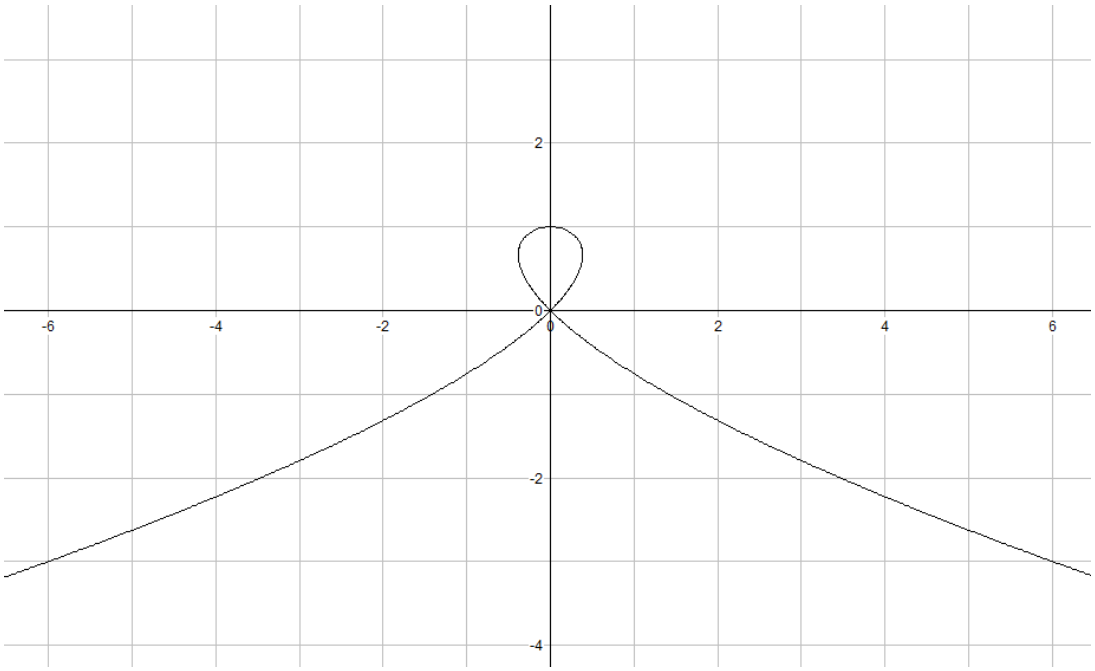
A cylinder viewed from the ‘side’

$y = \sin(x^3)$



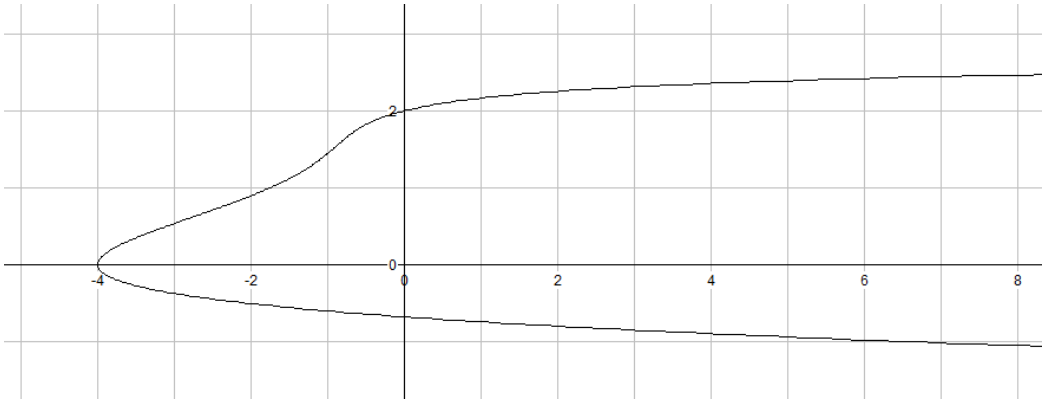
Repeats within repeats

$y = (\sin x)^{\sin x}$



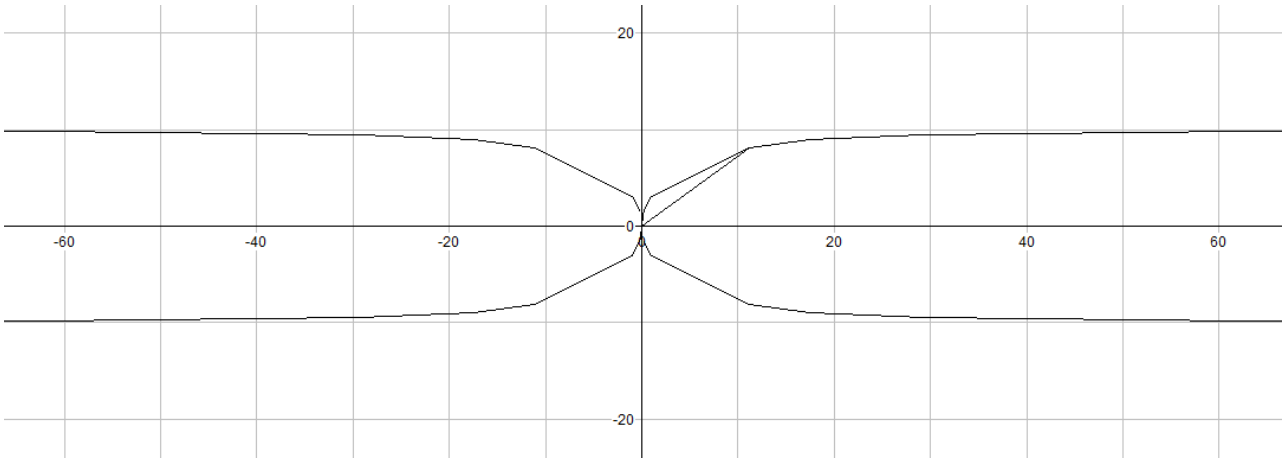
Loopy

$y^2 = x^2 + y^3$



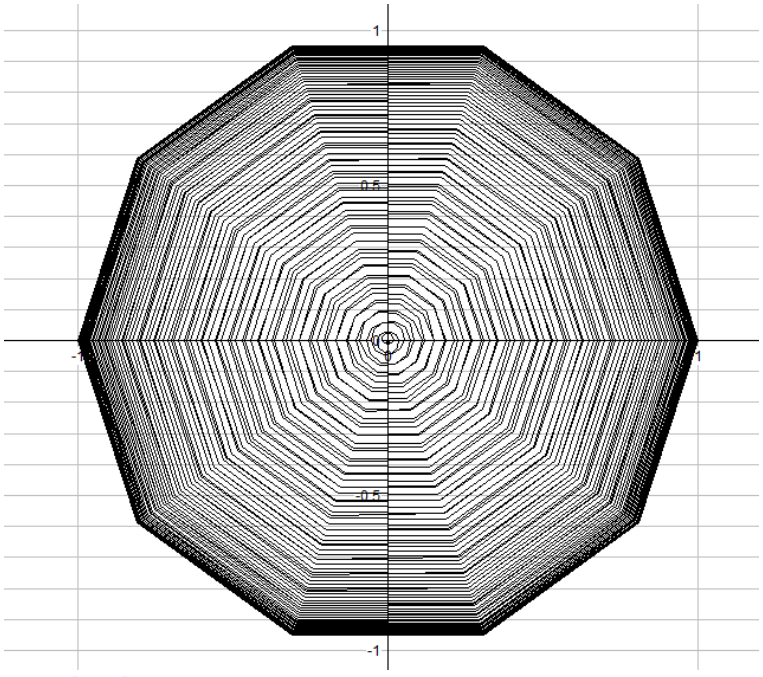
Aeroplane

$$(1-y)^2+\sqrt{x+4}=\frac{3}{3-y}$$



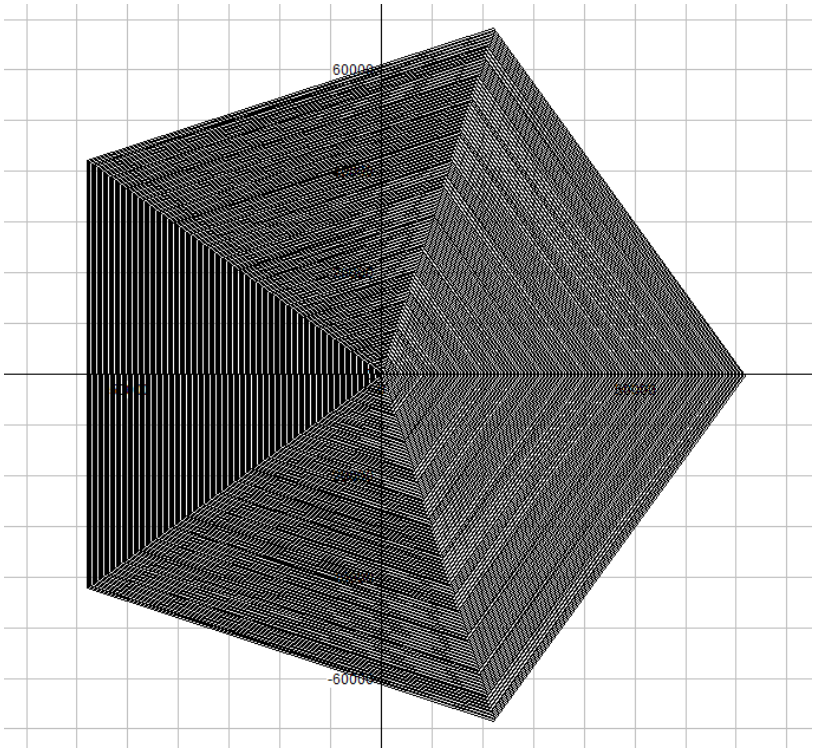
Train crash

$r=10\cot\theta$ for 100 revs



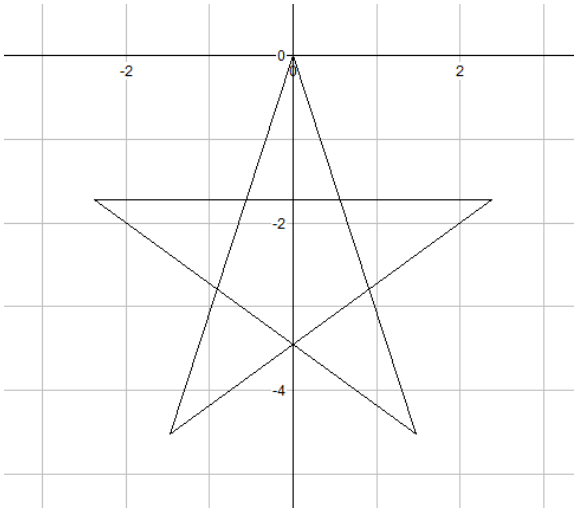
Regular decagon

$r=\cos(1+\sqrt{\theta})$ for 100 revs



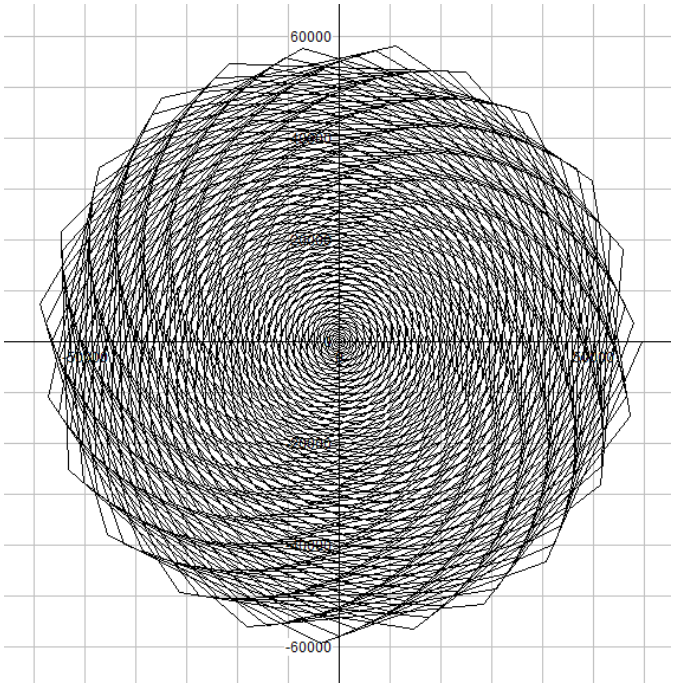
Regular pentagon

$r = \theta$ for 200 revs



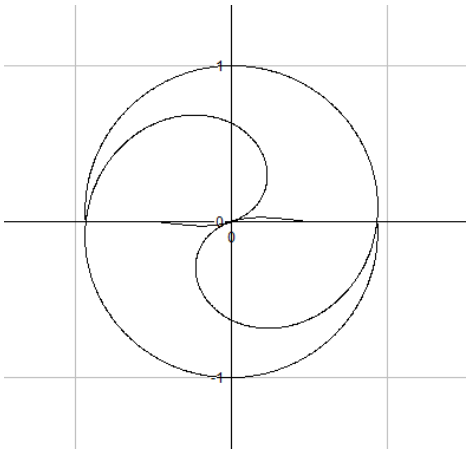
Pentagram

$r = 10\cos 2\theta \sin 2\theta$ for 200 revs



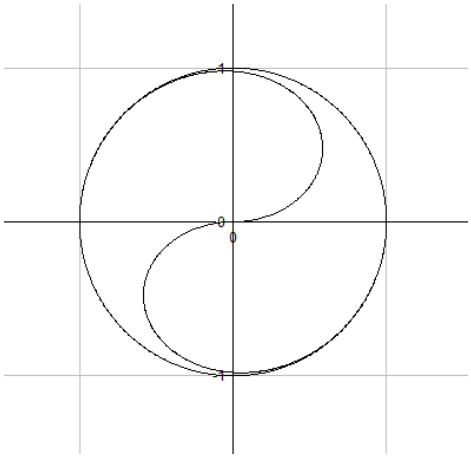
‘Wow’

$r = \dfrac{4\theta}{\pi}$ for 130 revs



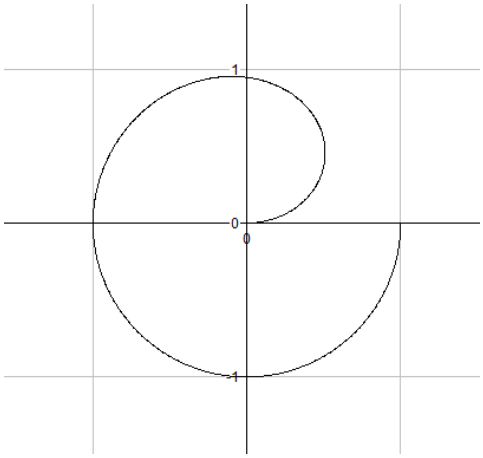
Ying yang 1

$r = \pm\cos\sqrt{\theta + 1}$ for 1 rev



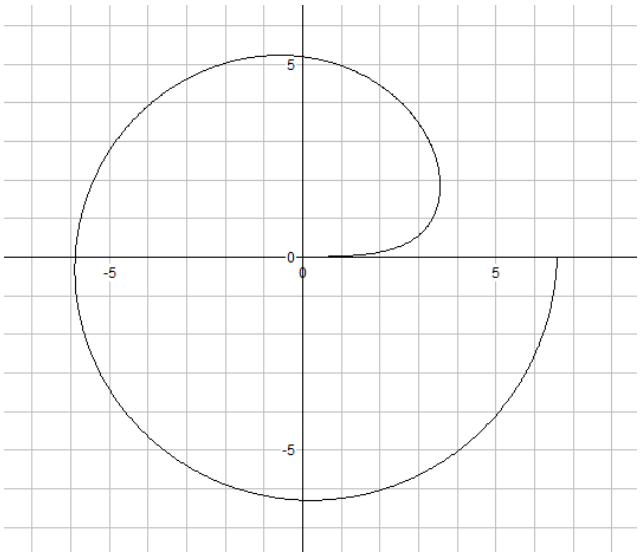
Ying yang 2

$r = \pm \tanh \frac{\theta}{40}$ for 1 rev



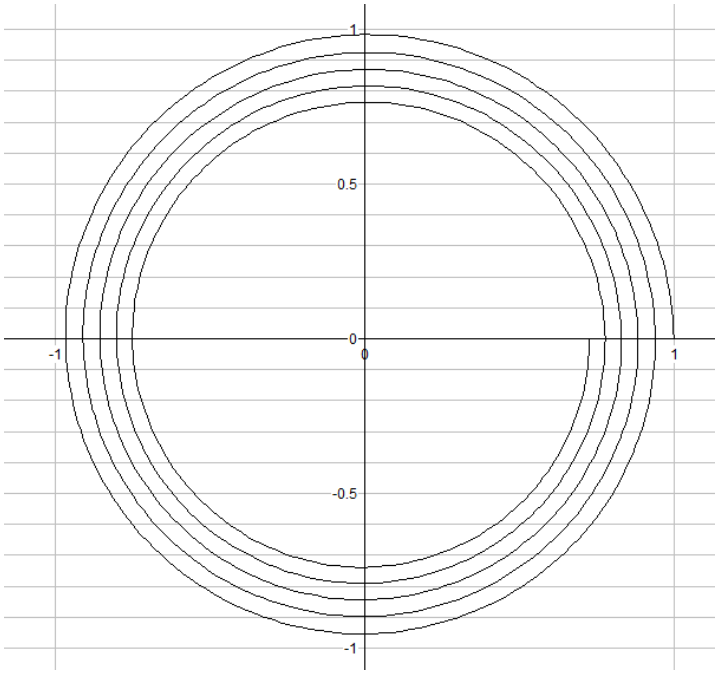
'e' 1

$r = \tanh \frac{\theta}{50}$ for 1 rev



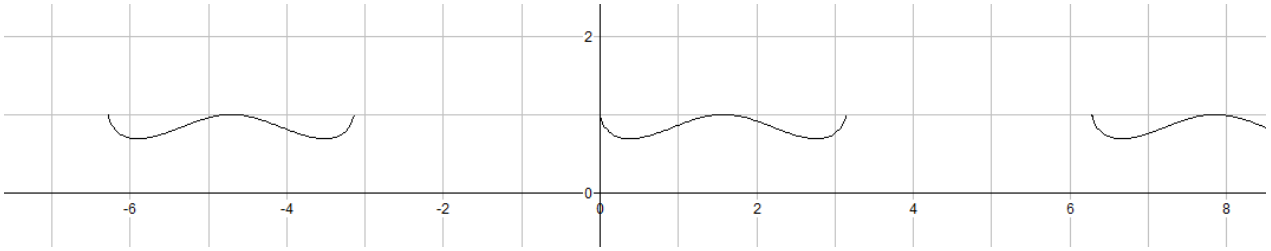
'e' 2

$r = \operatorname{arccosh} \theta$ for 1 rev



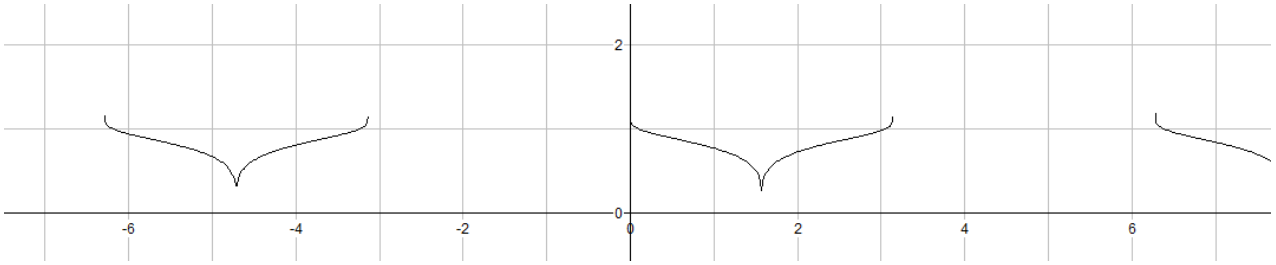
Spiral

$r = \cos(1+\sqrt{\theta})$ for 5 revs



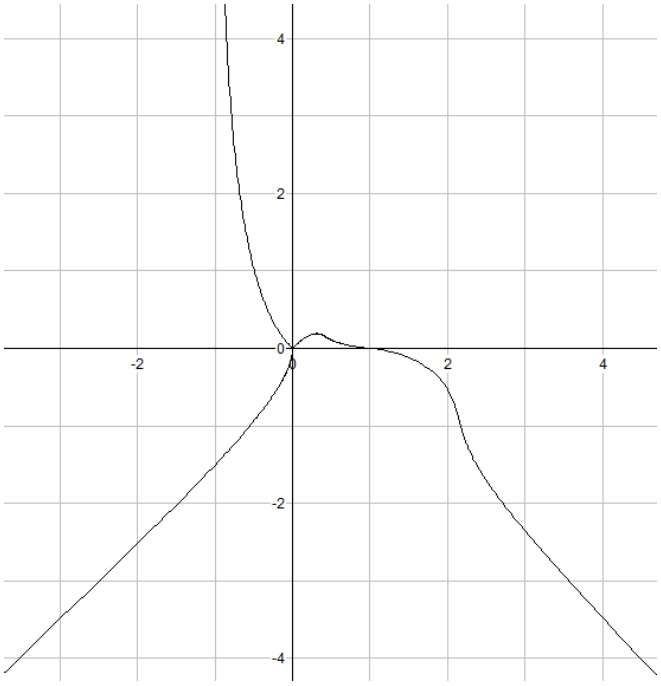
Brackets 1

$y = (\sin x)^{\sin x}$



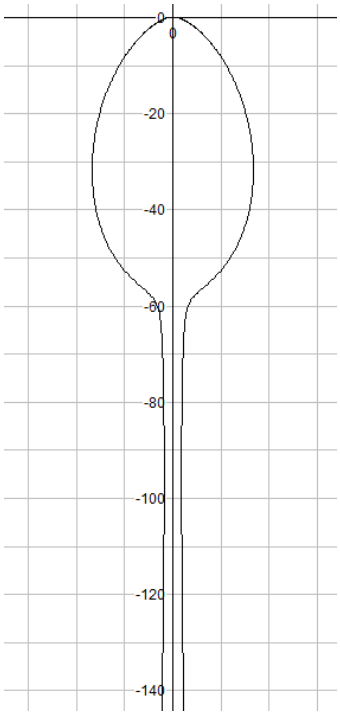
Brackets 2

$y = \sqrt[10]{-\log(\sin x)}$



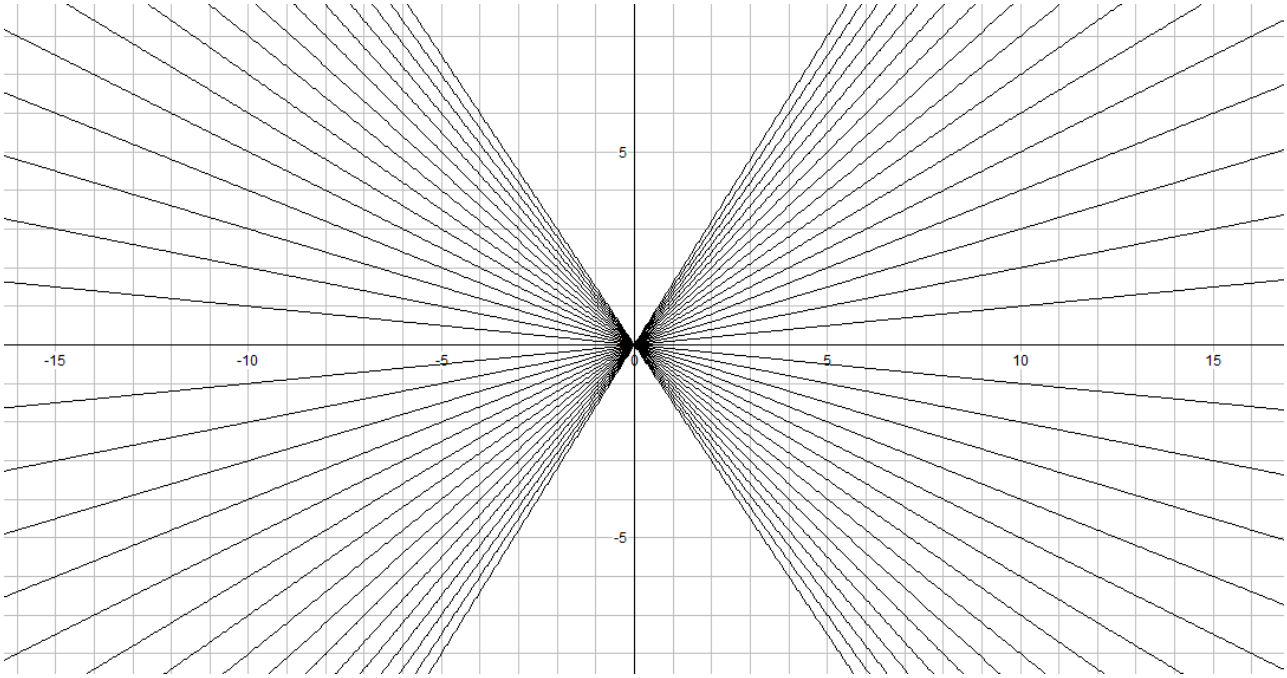
Road map

$r = (\sin\theta \cos 2\theta \tan\theta)^{\sin\theta}$



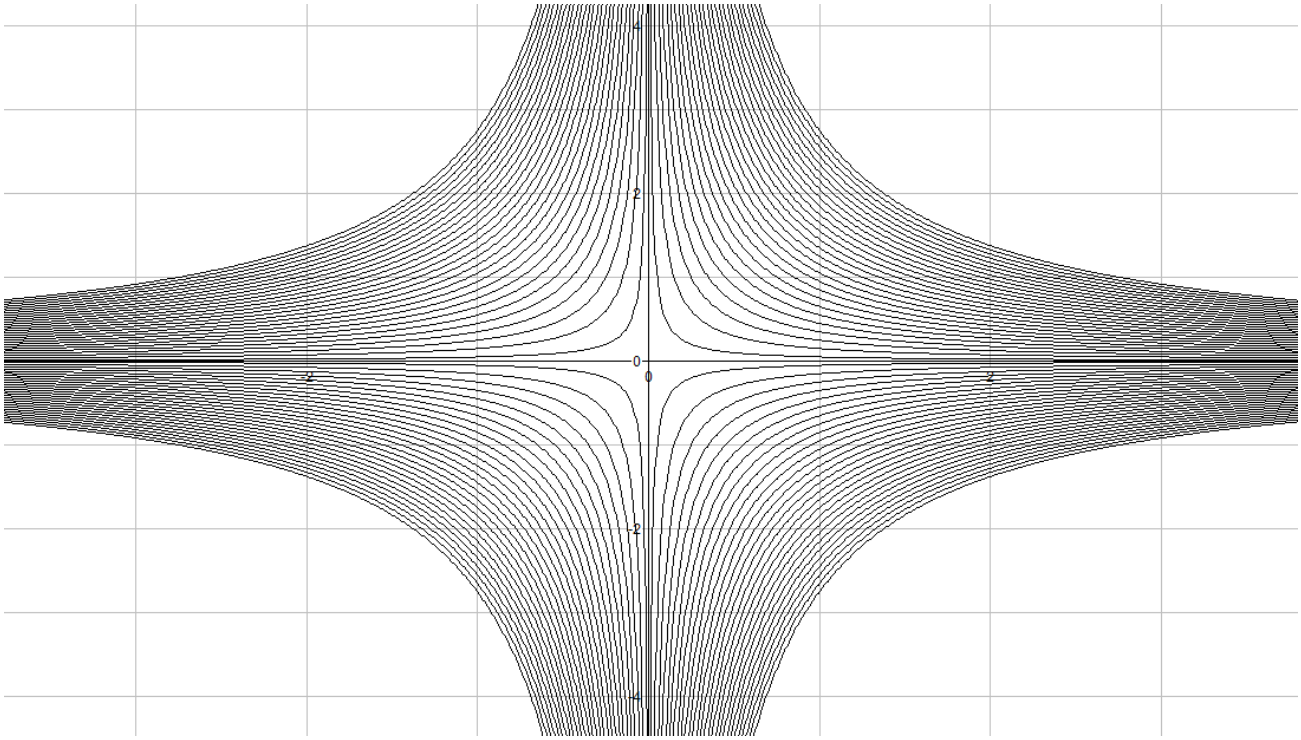
Spoon

$r = (\sin\cos\tan\theta)^{\sin\theta}$ for 1 rev



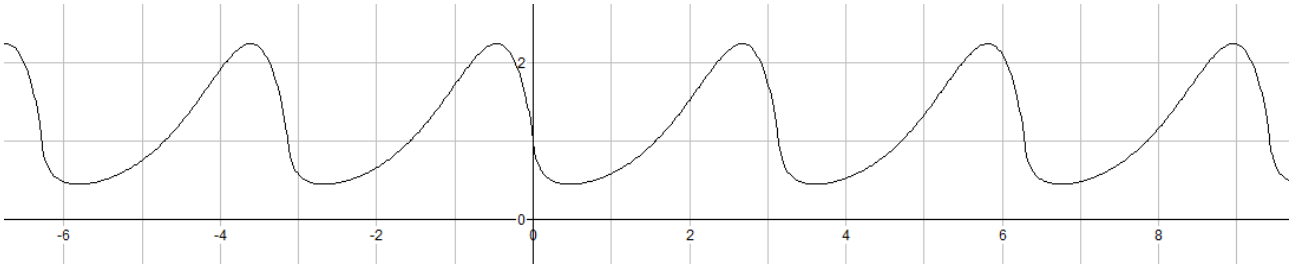
Long corridor

$$y = 0.05(1 \pm 1 \pm 2 \pm 4 \pm 8 \pm 16)x$$



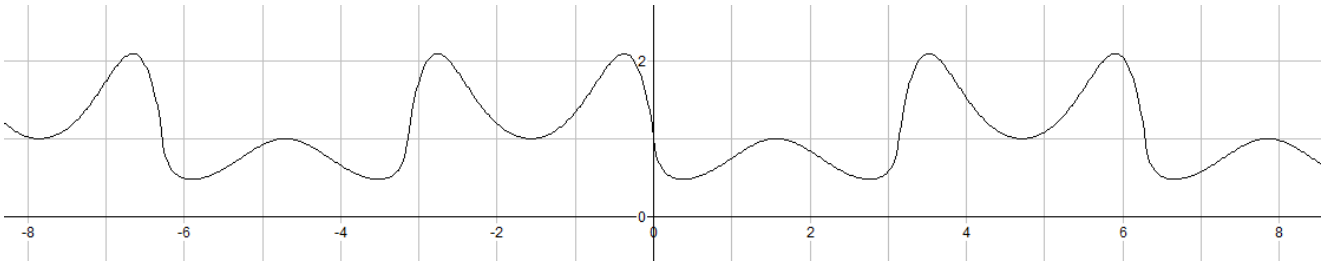
The slowest one to draw!

$$y = \frac{\pm 1 \pm 2 \pm 3 \pm 4 \pm 5 \pm 6 \pm 7 \pm 8 \pm 9 \pm 10}{20x}$$



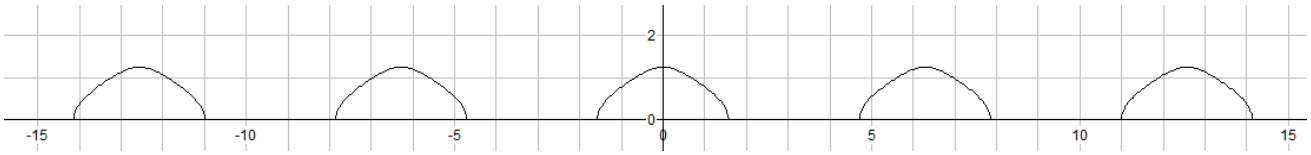
Rough sea

$y = (\sin x \cos x \tan x)^{\tan x}$



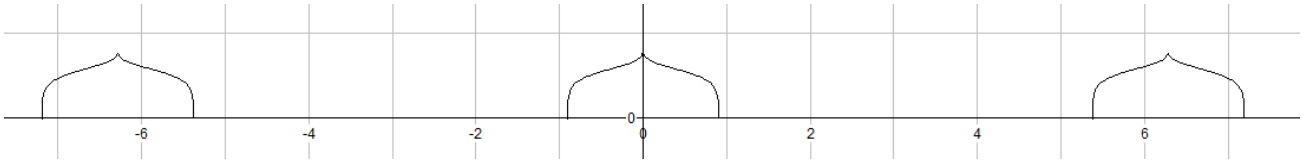
Very rough sea

$y = (\sin x \cos x \tan x)^{\sin x}$



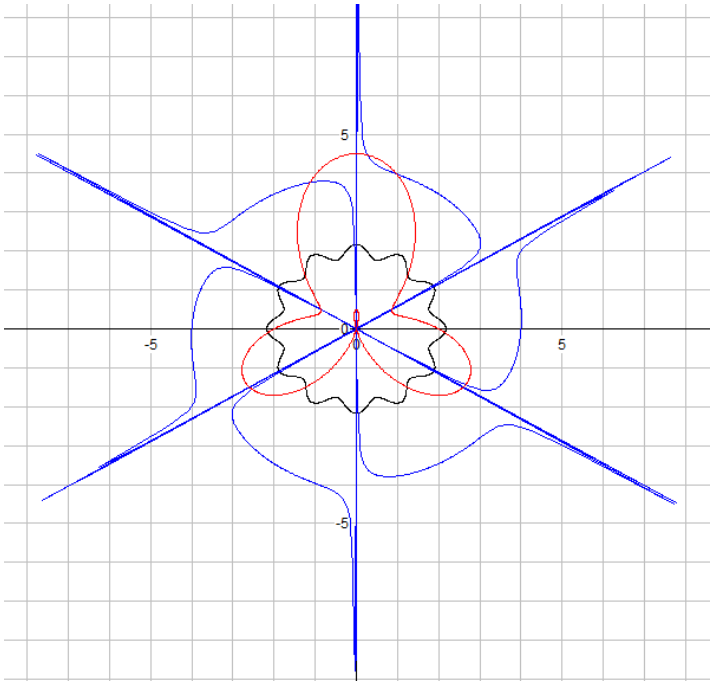
Scones on a tray

$y = \sqrt{\tan \cos x}$



Meringues on a tray

$y = \sqrt[10]{-\log(\tan x \sin x)} - 0.4$



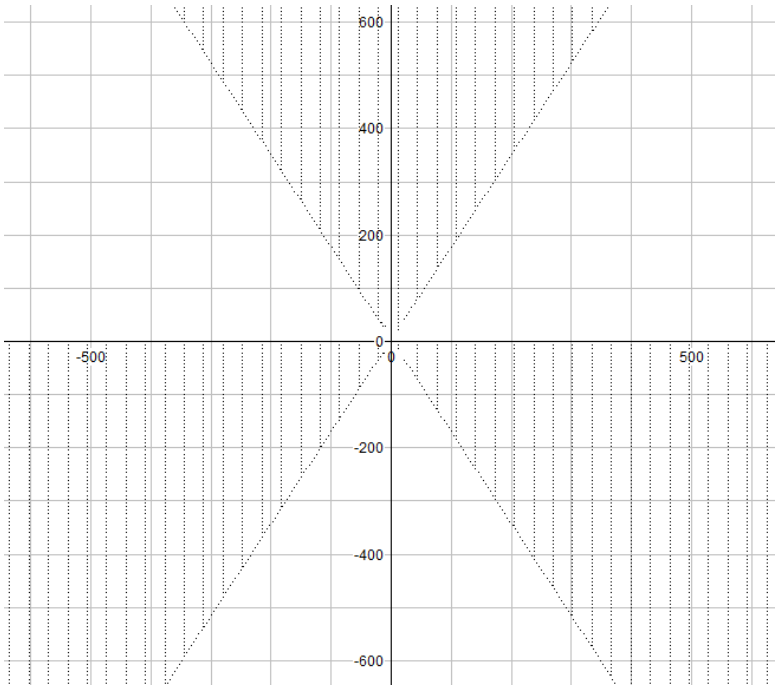
Symmetry

Can you tell which equation produces which curve?

$r = 2 + 10\sin\cos 12\theta$ for 1 rev

$r = 4 + 5\sin\tan 3\theta$ for 1 rev

$r = 2 - 1.5\sin 3\theta + \sin\theta$ for 1 rev



Triangles

$(y-3)^3 + (y-2)^2 + x + 1 \geq 3x^2 y$

Can you justify why this drawing has an order of rotational symmetry of 3?

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