Vauxhall Teachers Try Different Ideas

Bill Skelly writes:

In our Math 30 class, we have been doing work on finding factors of polynomials by synthetic division. I have found a way of limiting the number of possible factors of a polynomial under certain conditions.

Here is an example: Find the ratio of 4/12 = 1/3 and ± 1/3 are possible zeros.

$12x^3 - 4x^2 - 3x + 1$

$-\frac{1}{3}$	12	-4	-3	1
		-4	-0	1
	12	0	-3	0

$p(x) = (x - 1/3) \quad (12x^2 - 3)$

$12x^2 = 3$

$x = 1/3, \; x^2 = 3/12 = 1/4$

$x = \pm 1/2$

Take the second coefficient and put it over the first, and the fourth over the third, and you get the same ratio.

This formula works only under the following conditions:

1. there must be 4 terms
2. they must appear in descending order
3. it does not matter if a term is missing
4. and a zero is a ± of the ratio of the coefficient
5. the coefficients must be in a ratio to each other:

$$\frac{\text{second coefficient}}{\text{first coefficient}} = \frac{\text{fourth coefficient}}{\text{third coefficient}}$$

We tried this for several other polynomials which abide by these conditions and they also work.

... and Byron Skretting writes:

In our Math 30 class, we have been doing conic sections. In doing the circle, we were given a formula for finding the centre when the equation for the circle was in general form, $\left(\frac{-D}{2}, \frac{-E}{2}\right)$.

After moving on to the ellipse, we couldn't find any formula for finding the centre of the ellipse when the equation was written in general form.

We started off with an equation for a particular ellipse with the centre (5,3) in standard form and converted it to general form.

$$\frac{(x - 5)^2}{25} + \frac{(y - 3)^2}{16} = 1$$

$$16(x-5)^2 + 25(y-3)^2 = 400$$

$$16(x^2-10x+25)+25(y^2-6y+9) = 400$$

$$16x^2-160x+400+25y^2-150y+225 = 400$$

$$16x^2+25y^2+{}^{-}160x+{}^{-}150y+225 = 0$$

$$A=16 \quad C=25 \quad D={}^{-}160 \quad E={}^{-}150 \quad F=225$$

I then noticed that if you take ($\frac{-D}{2A}$, $\frac{-E}{2C}$), you would get the centre of the ellipse.

$$x=\frac{-D}{2a}=\frac{160}{2x16}=\frac{160}{32}=5$$

$$y=\frac{-E}{2C}=\frac{150}{2x25}=\frac{150}{50}=3$$

centre = (5,3)

We tried this for several other ellipses and it seems to work for all ellipses.

EDITOR'S NOTE: I appreciate Bill and Byron taking the time to share their ideas with us. May their example serve as an encouragement to others to share ideas and suggestions through delta-K.

In addition to your ideas, I would also be pleased to publish any reactions to the above methods. If you prefer to correspond directly with either Bill or Byron, their address is Vauxhall Junior-Senior High School, Box 618, Vauxhall, Alberta TOK 2KO.