

How crazy could it be?

Break-Ground:

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Two young mathematicians think about the plots of functions.

Check out this dialogue between two calculus students (based on a true story):

Devyn: Riley, do you remember when we first starting graphing functions?
Like with a “T-chart?”

Riley: I remember everything.

Devyn: I used to get so excited to plot stuff! I would wonder: “What crazy curve would be drawn this time? What crazy picture will I see?”

Riley: Then we learned about the slope-intercept form of a line. Good-old

$$y = mx + b.$$

Devyn: Yeah, but lines are really boring. What about polynomials? What could you tell me about

$$y = 5x^6 - 5x^5 - 5x^4 + 5x^3 + x^2 - 1$$

just by looking at the equation?

Riley: Hmmmm. I’m not sure...

Problem 1 When x is a large number (furthest from zero), which term of $5x^6 - 5x^5 - 5x^4 + 5x^3 + x^2 - 1$ is largest (furthest from zero)?

Multiple Choice:

- (a) -1
- (b) x^2
- (c) $5x^3$
- (d) $-5x^4$
- (e) $-5x^5$
- (f) $5x^6$ ✓

Learning outcomes: Know the graphs and properties of “famous” functions.

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Problem 2 When x is a small number (near zero), which term of $5x^6 - 5x^5 - 5x^4 + 5x^3 + x^2 - 1$ is largest (furthest from zero)?

Multiple Choice:

- (a) -1 ✓
- (b) x^2
- (c) $5x^3$
- (d) $-5x^4$
- (e) $-5x^5$
- (f) $5x^6$

Problem 3 Very roughly speaking, what does the graph of $y = 5x^6 - 5x^5 - 5x^4 + 5x^3 + x^2 - 1$ look like?

Multiple Choice:

- (a) The graph starts in the lower left and ends in the upper right of the plane.
- (b) The graph starts in the lower right and ends in the upper left of the plane.
- (c) The graph looks something like the letter “U.” ✓
- (d) The graph looks something like an upside down letter “U.”