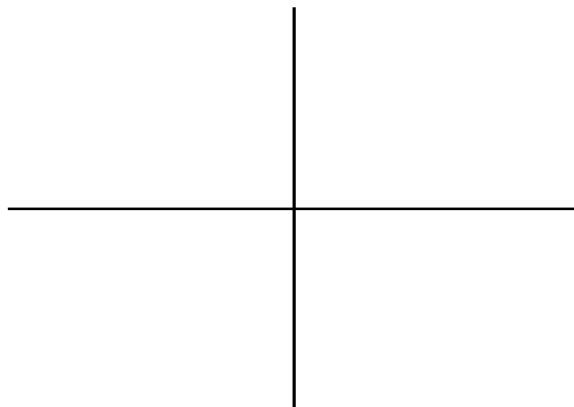


Show all your work for full credit. Unjustified and supported answers = 0 points. Please use a pencil. Remember to use place holders for synthetic division when necessary.

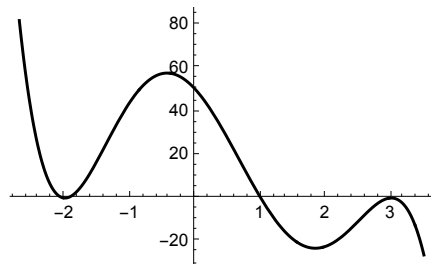
1. Make a sketch by hand of the polynomial function showing all important features (zeros, intercepts, etc.). Include coordinates and labels. Do not graph it on your calculator.

$$f(x) = (x + 8)^2 (2x - 3) (x - 5)^3$$



[/4]

2. An engineer is designing a roller coaster and needs it to have the given profile. Find a polynomial function of lowest degree that will model the roller coaster. **Note:** the y-intercept is exactly (0, 50). **Don't multiply it out.**



[/4]

3. For the polynomial $g(x) = 3x^5 - 17x^2 - 9x + 12$, list all the possible rational zeros. **Do not find the zeros.**

[/4]

4. For the polynomial $f(x) = 2x^6 - 11x^4 + 9x^3 + 37x^2 - 67x - 30$, list all the possible combinations of *positive*, *negative*, and *complex* zeros. **Do not find the zeros.**

[/4]

5. For the polynomial $f(x) = 3x^4 - 2x^3 - 5x - 18$, **(Do not find the zeros.)**

- a) determine if 2 is an upper bound for the rational zeros.
- b) determine if -1 is a lower bound for the rational zeros.

[/4]

6. The polynomial $f(x) = 2x^5 - 15x^4 + 52x^3 - 91x^2 + 76x - 24$ has rational zeros $x = 3/2$ with multiplicity one, and $x = 1$ with a multiplicity two.

- (a) Find the other zeros. Be sure to show your work.
- (b) Write the polynomial in factored form (no fractions) with linear and irreducible quadratic factors.

Zeros

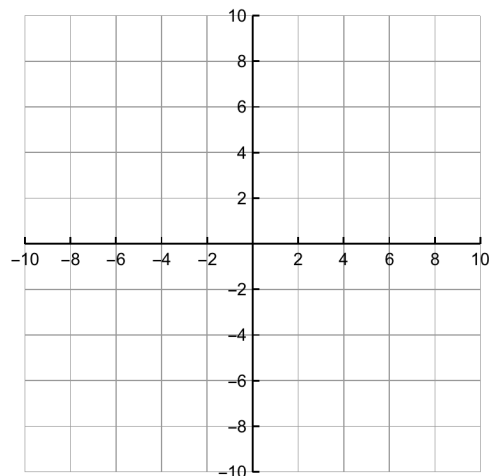
Factored Form

[/8]

7. Find the polynomial with integer coefficients that has zeros $x = -5$, $x = \frac{1}{2}$, and $x = 2i$.

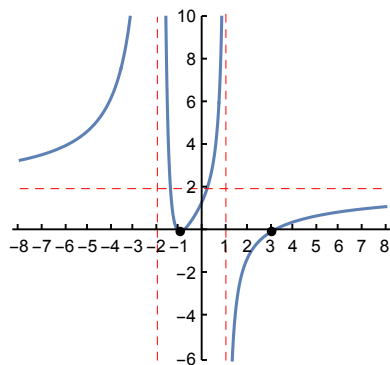
[/6]

8. Make an accurate sketch of the function giving the coordinates of all x-intercepts, y-intercepts, asymptotes, and any other important features. $f(x) = \frac{2x^2 - 6x - 36}{x^2 - 16}$. Do not use your calculator.



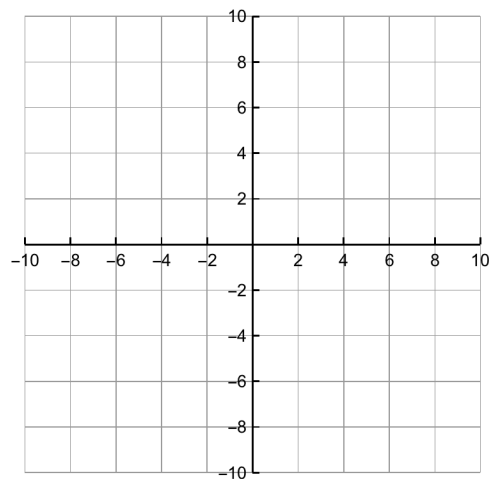
[/6]

9. Find a rational function whose graph is given.



[/6]

10. Make an accurate sketch of the function giving the coordinates of all x-intercepts, y-intercepts, asymptotes, and any other important features. $f(x) = \frac{x^2 - 3x - 4}{x - 2}$. Do not use your calculator.



[/6]