Precalculus
2.3 Homework – Polynomial Graphs

Determine which functions are polynomials. For those that are, state the degree. For those that are not, explain why not.

1. $f(x)=\dfrac{3-2x^3}{5}$
2. $F(x)=\dfrac{4x^2-3}{2x^3}$
3. $g(x)=x^{5/2}-x^4+2$
4. $h(x)=-3$
5. $G(x)=2(x+3)^2(x^2+4)$
6. $f(x)=\sqrt{x}(\sqrt{x}+2)$
7. $h(x)=\dfrac{1}{2}-\pi x$
8. $g(x)=2x^{-3}+x^2$

Graph the functions using transformations of the graphs of $y = x^4$ or $y = x^5$.

9. $f(x)=\dfrac{1}{2}x^5-4$
10. $f(x)=2-(x+3)^4$ (Hint: Rearrange)

Form a polynomial function with real coefficients whose degree and real zeros are given. Your answer must be completely multiplied out (not in factored form).

11. Degree 3; Zeros: -1, 3, 5
12. Degree 3; Zeros: -7, 0, 2
13. Degree 4; Zeros: -4, multiplicity 2; 1, multiplicity 1; 2, multiplicity 1

For each polynomial function, do the following:

(a) List each real zero and its multiplicity.
(b) Determine whether the graph crosses or touches the *x*-axis at each *x*-intercept.
(c) Find the *y*-intercept.
(d) Determine the end behavior: Find the <u>power function</u> that the graph of f resembles for large values of $|x|$ AND <u>draw arrows</u> to indicate which directions the ends are pointing.
(e) Determine the maximum number of turning points of the graph.
YOU DO NOT NEED TO DRAW THE GRAPH!

14. $f(x)=-4(x+\frac{1}{2})^2(x-1)^3$
15. $f(x)=(x^2+4)(x-5)^3$
16. $f(x)=3x(x^2-4)(x+5)$

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(d) Determine the end behavior: Find the <u>power function</u> that the graph of f resembles for large values of $|x|$ AND <u>draw arrows</u> to indicate which directions the ends are pointing.
(e) Determine the maximum number of turning points of the graph.
(f) SKETCH THE GRAPH!

17. $f(x)=x^2(x-3)(x+3)$
18. $f(x)=3(x-6)(x+4)^2$
19. $f(x)=-2(x+2)(x-1)^3$
20. $f(x)=\dfrac{1}{2}(x-3)^2(x+2)^2$
21. $f(x)=-4x(x^2-5)$ Hint: It can be factored further – there are three real zeros!

22. Is it possible for the graph of a polynomial function have no *y*-intercept? Explain why or why not. Is it possible for the graph of a polynomial function to have no *x*-intercepts? Explain why or why not.