Precalculus Unit 1 quiz 1: Degree, end behavior and the shape of a polynomial graph, Graphing polynomial functions, Graphing rational functions

Name _____ Date _____ Period _____

7 questions, 20 points

1. Let $f(x) = \dfrac{(x-3)^2(x+2)}{x-1}$. Give the sign of f on each interval. Then use the signs to say whether the graph crosses or touches the axis at each zero, and what it does on each side of $x = 1$. (2 points)

2. Let $p(x) = 2x^4(x+4) - 2x^5 - 6x + 7$. (3 points)

(a) Find the degree and the leading coefficient of p.

(b) Describe the end behavior of p in arrow notation.

(c) What is the greatest number of real zeros p can have, and the greatest number of turning points?

3. Let $p(x) = (kx-2)^3(x+1)(3-x)^2$, where k is a number. (3 points)

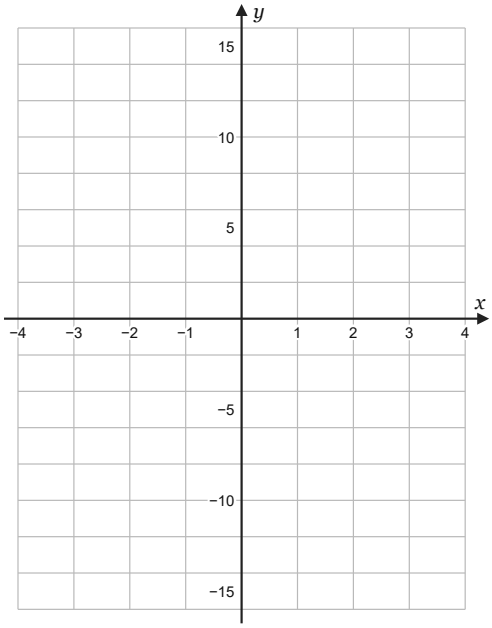
(a) Suppose $k \neq 0$. Find the leading term of p in terms of k, and find every value of k for which both ends of the graph fall.

(b) Suppose $k = 0$. Find the degree and the leading term of p, and describe its end behavior in arrow notation.

4. Sketch the graph of a polynomial with all of these features:

- degree 5 and a positive leading coefficient,
- exactly one real zero,
- exactly two turning points.

Then give the range of your polynomial. (3 points)



Free sample from math.wiki for classroom use. Do not post. math.wiki

5. Let $f(x) = (x^2 - 2x - 3)^2$. (3 points)

(a) Write $f(x)$ as a product of linear factors, and give each zero with its multiplicity.

(b) Explain why $f(x) \geq 0$ for every x. Give the end behavior and the y-intercept, and sketch the graph.

(c) Find every peak and valley of the graph exactly.

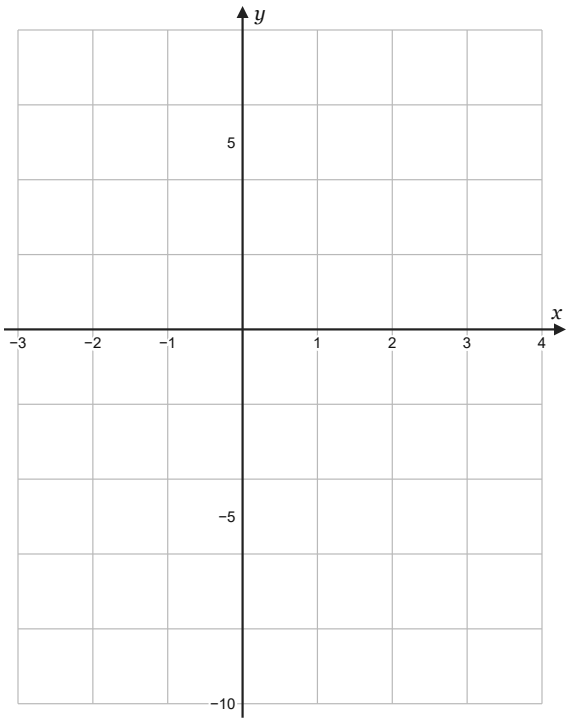
6. Let $f(x) = \dfrac{(x+1)^m(x-4)}{(x-2)^n}$, where m and n are positive whole numbers. Its graph touches the horizontal axis at $x = -1$ without crossing, and goes down on both sides of $x = 2$. (3 points)

(a) Is m even or odd? Is n even or odd? Explain.

(b) Give the sign of f on each interval.

(c) Take $m = 2$. For which n does the graph have the horizontal asymptote $y = 0$? Can it have the horizontal asymptote $y = 1$?

7. Sketch the graph of $f(x) = -(x^2 + 2)(x + 1)(x - 2)$. Give its zeros, its end behavior, its y-intercept, the sign of $f(x)$ on each interval and the value $f(1)$, and say how many turning points your sketch has. (3 points)



Free sample from math.wiki for classroom use. Do not post. math.wiki