Math 1410: Worksheet 6

October 1, 2021

Name: _____

1. Consider the polynomial function

$$p(x) = -3(x+20)^4(x+10)^3x^2(x-10)(x-20)^6(x-30)^6(x^2+x+4)^3.$$

   (a) What are the roots of $p(x)$, and their multiplicities? What is the degree of $p(x)$?

   (b) Create a sign diagram for $p(x)$, and use it to determine where $p(x) \geq 0$. (Give your answer in interval notation.)

   (c) Use your sign diagram to sketch a graph of $p(x)$.

2. Consider the rational function

$$r(x) = \frac{x^2 + 1}{(x-1)^2(x+1)^2}.$$

(a) Determine the domain of $r(x)$. (Write your answer in interval notation.)

(b) Determine the long-term behavior of $r(x)$. That is, what happens to $r(x)$ as $x \to \infty$ and $x \to -\infty$?