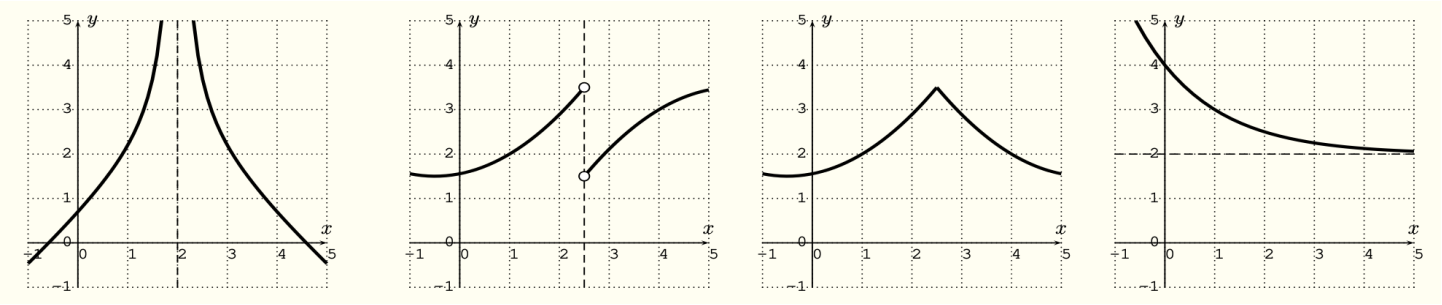
MAT 1375, Classwork8, Fall2024

ID:_____ Name:_____

1. The domain of a polynomial f is _____, and it is continuous for all real numbers and there are no _____, no _____ or _____ asymptotes, and no _____

The following graphs **cannot** be graphs of polynomials:



_____ _____ _____ _____

2. Factors and roots of polynomials:

Every n-degree polynomial $f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x^1 + a_0,\ (a_n \neq 0)$ can be factored as $f(x) = a_n(x - \boldsymbol{c_1})(x - \boldsymbol{c_2}) \cdots (x - \boldsymbol{c_n})$.

Thus, the polynomial $f(x)$ of degree n has **at most** _____ roots (which are $c_1, c_2, \cdots, c_n$) and these roots may be either _____ or _____.

Let f be a polynomial with all **real coefficients**. The complex roots are always found as a **pair**, that is, if $c = a + bi$ is a complex root of f, then the complex _____ $\bar{c}$ =_____ is also a root of f.

3. Let $f(x) = x^3 - x^2 + 2$. Find all the roots of $f(x)$. Sketch a complete graph and label all roots.

4. Definition of the **Rational function**:

A _____ function is a fraction of two polynomials $f(x) = \frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are both _____, and _____$\neq 0$.

The **domain of a rational function** f is all real numbers for which the denominator $q(x)$ is not zero: $D_f = \{ x \mid$_____$\}$

5. **Arrow Notation**: Given a constant a and we have

$x \to a^+$:	x approaches a from the **right** (x is very closed to a but $x \neq a$ and x_____ a)
$x \to a^-$:	x approaches a from the **left** (x is very closed to a but $x \neq a$ and x_____ a)
$x \to \infty$:	x approaches infinity (x increases without bound)
$x \to -\infty$:	x approaches negative infinity (x decreases without bound)