MATH 1023 COLLEGE ALGEBRA — Worksheet 3 — Name:

PROF. PAUL BAILEY — April 14, 2004

A *polynomial function* is a function of the form

$$f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0,$$

where $a_i \in \mathbb{R}$ and $a_n \neq 0$. The *degree* of $f(x)$ is $\deg(f) = n$. The real numbers a_i are the *coefficients* of $f(x)$. The *leading coefficient* of $f(x)$ is a_n. The *constant coefficient* of $f(x)$ is a_0.

The *zeros*, or *roots*, of $f(x)$ are the *complex* solutions to the equation $f(x) = 0$.

The *y-intercept* of $f(x)$ is the point $(0, f(0))$.

The *x-intercepts* of $f(x)$ are the points $(r, 0)$, where r is a *real* root of $f(x)$.

The *shape* of $f(x)$ is

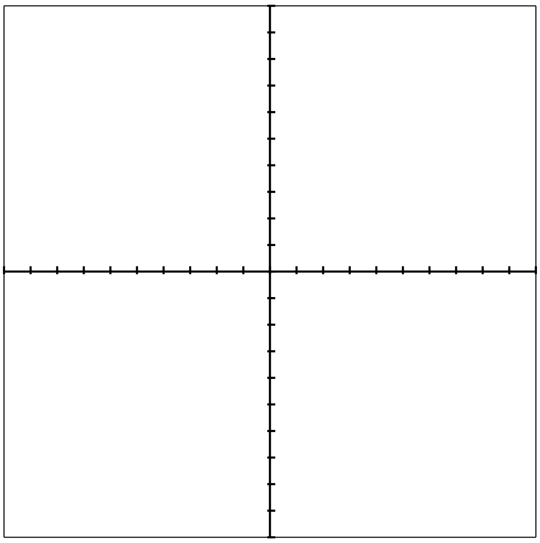
(a) $+|+$ if n is even and $a_n > 0$;

(b) $-|-$ if n is even and $a_n < 0$;

(c) $-|+$ if n is odd and $a_n > 0$;

(d) $+|-$ if n is odd and $a_n < 0$.

Find the degree, leading coefficient, roots, intercepts, and shape of $f(x)$. Use the intercepts and the shape to sketch the graph of $f(x)$.



Problem 1: $f(x) = \sqrt{5} - 2x$

Degree:

Leading Coefficient:

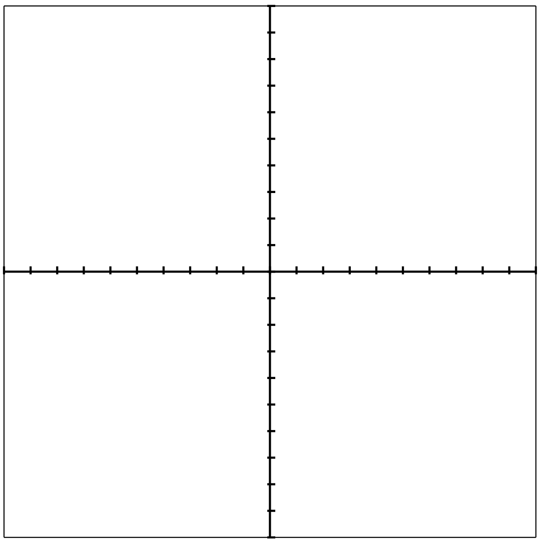
Constant Coefficient:

Roots:

***y*-intercept:**

***x*-intercepts:**

Shape:



Problem 2: $f(x) = 9 - x^2$

Degree:

Leading Coefficient:

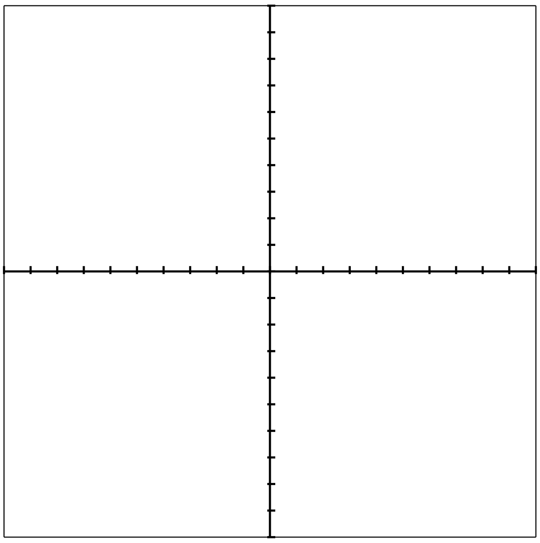
Constant Coefficient:

Roots:

***y*-intercept:**

***x*-intercepts:**

Shape:



Problem 3: $f(x) = x^3 - 2x^2 - 7x + 14$

Degree:

Leading Coefficient:

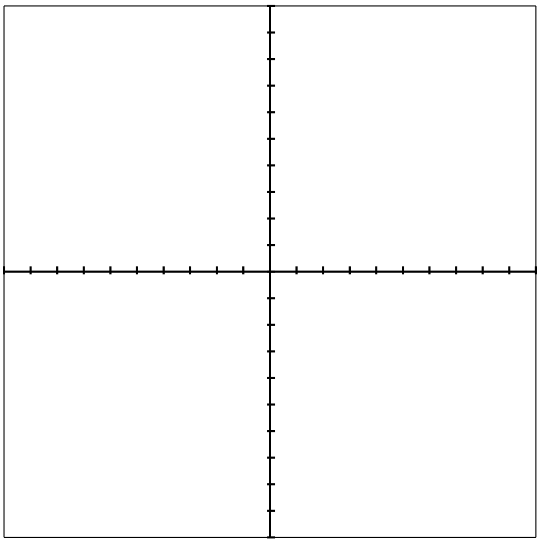
Constant Coefficient:

Roots:

y-intercept:

x-intercepts:

Shape:



Problem 4: $f(x) = x^4 - 3x^2 + 2$

Degree:

Leading Coefficient:

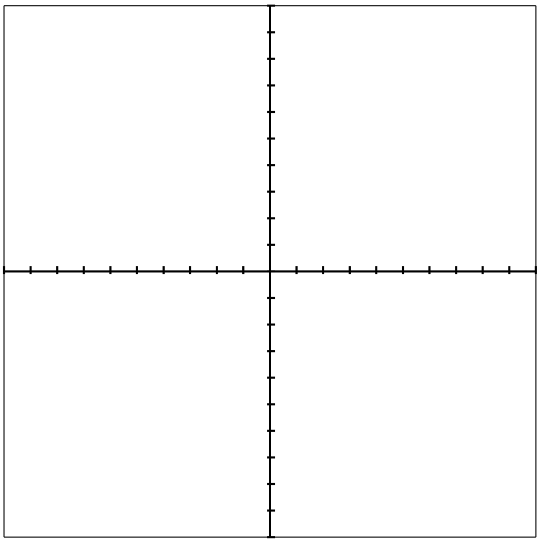
Constant Coefficient:

Roots:

y-intercept:

x-intercepts:

Shape:



Problem 5: $f(x) = x^3 - 8x^2 + 5x + 50$

Degree:

Leading Coefficient:

Constant Coefficient:

Roots:

y-intercept:

x-intercepts:

Shape:

Hint: Guess a root r via the Rational Roots Theorem, find $f(x) \div (x - r)$, then factor.)