ALGEBRA II
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PRACTICE Exam 3
Thursday, October 28, 2021

Name:

- *ALL* answers must the justified with appropriate words, sentences, and/or computations.
- *DO NOT* write a negative number inside a square root.
  Make appropriate use of the symbol i if necessary.
- *Standard Form* of a complex number is $x + yi$. Always write complex numbers in standard form.
- *Standard Form* of a polynomial is $a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$; that is, with like terms combined, and in decreasing power order. Always write polynomials in standard form, unless otherwise indicated.

The examination will contain five problems which are worth 20 points each, and two bonus problems worth an additional 20 points each, for a maximum of 100 points.

Problem 1. (Definitions)
State the precise definition, as given in class, of the following terms.

(a) Vertical Line Test

(b) Parabola

(c) Monomial

(d) Degree of a Polynomial

(e) Leading Coefficient of a Polynomial

Problem 2. (Solving Equations)
Find all real numbers x which satisfy the following equations. Using correct set notation, write the solution set.

(a) $5x - 2 = 2x + 27$

(b) $5x^2 = 35$

(c) $x^2 - 20x + 100 = 0$

(d) $x^2 - 6x + 9 = 0$

(e) $x^2 - x - 1 = 0$

Problem 3. (Complex Numbers)
Let $z = 5 - 2i$ and $w = 6 + 8i$. Compute the following.

(a) $z + w$

(b) $3z - 2w$

(c) $|w|$

(d) zw

(e) z/w

Problem 4. (Polynomials) Compute the following polynomials. Write the result in standard form.

(a) $(2x-4)(x+1)$

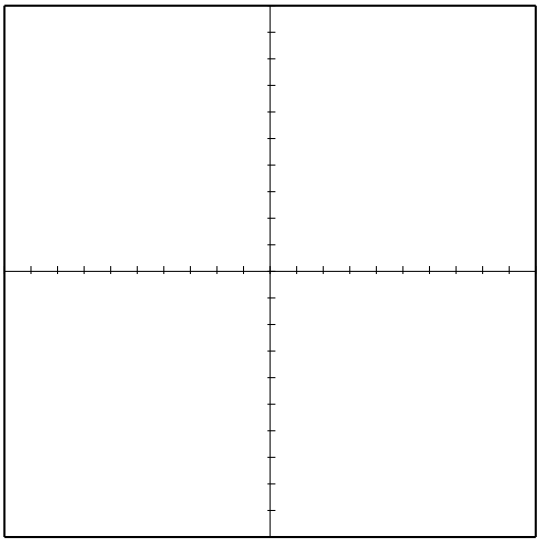
(b) $(5x^4+2x^2-3x+7)+(x^3-x+7x^2-3)$

(c) $(x-1)(x-2)(x-3)$

(d) $(x^3+2x^2-x+9)(x^2+x-5)$

Problem 5. (Graphing) Fill out the charts, and sketch the graph.

(a) Consider the linear function $f(x)=3(x-4)+5$. Find the slope-intercept form $f(x)=mx+b$ of the function, and identify the numbers m and b. Find the slope, the y-intercept, and the x-intercept (if any) of the line. Graph the line and label these points.



Linear Function: $f(x)=3(x-4)+5$

Standard Form:

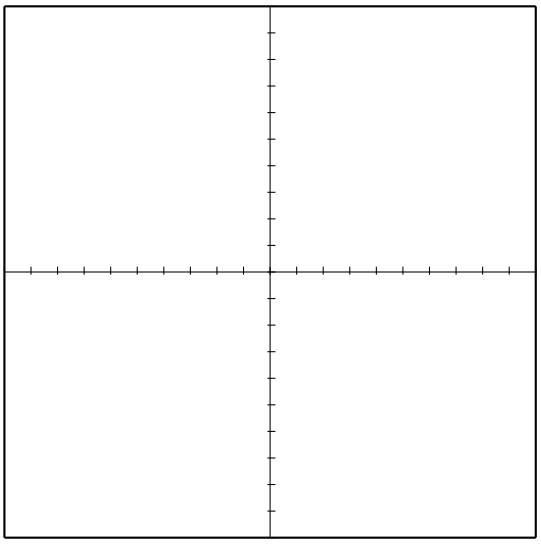
m: **b:**

Slope:

y-intercept:

x-intercept:

(b) Consider the quadratic function $f(x)=x^2-9x+14$. Find the standard form $f(x)=ax^2+bx+c$ and the shifted form $f(x)=a(x-h)^2+k$. Identify the constants a, b, c, h, and k. Find the zeros, intercepts, and vertex. Graph the function and label these points.



Quadratic Function: $f(x)=x^2-9x+14$

Standard Form:

Shifted Form:

a: **b:** **c:** **h:** **k:**

Discriminant:

Zeros:

y-intercept:

x-intercept(s):

Vertex:

Problem 6. (Bonus) Divide $x-3$ into x^3-3x^2+5x-4. Find the quotient and remainder.