

Honors Math III  
Unit 4 – Polynomials Review

Name: Yost

1. A flower bed is to be 3 m longer than it is wide. The flower bed will have an area of  $108 \text{ m}^2$ . What will its dimensions be?

9 x 12 meters

2. A rectangular garden is 30 m by 50 m. Part of the garden is torn up to install a gravel walkway of uniform width around the garden. The new area of the garden is  $\frac{1}{5}$  of the old area. How wide is the gravel walkway?

10 meters

3. Solve:

a.  $2x - 9\sqrt{x} + 4 = 0$

$x = 4, 16$

b.  $4(x + 5)^2 - (x + 5) - 5 = 0$

$x = -6, -15/4$

c.  $2\left(\frac{1}{x}\right)^2 + \left(\frac{1}{x}\right) - 1 = 0$

$x = 2, -1$

d.  $(y^2 - 5y)^2 - 2(y^2 - 5y) - 24 = 0$

$y = 6, -1, 1, 4$

4. Write a quadratic equation with integral coefficients that has the roots  $4 \pm i\sqrt{2}$

$x^2 - 8x + 18 = 0$

5. Factor each of the following:

a.  $x^2y^2 - 9x^2 + 16y^2 - 144$

$(x^2+16)(y+3)(y-3)$

b.  $8y^3 - 125$

$(2y-5)(4y^2+10y+25)$

c.  $x^3y - 25xy^3$

$xy(x-5y)(x+5y)$

d.  $64p^3 + 27q^3$

$(4p+3q)(16p^2-12pq+9q^2)$

e.  $-37x^2 + x^4 + 36$

$(x-6)(x+6)(x-1)(x+1)$

f.  $8(x-3)^2 - 64(x-3) + 128$

$8(x-7)(x-7)$

g.  $(x-p)^2 - p^2$

$(x-2p)(x)$

h.  $16a^6 + 54b^3$

$2(2a^2+3b)(4a^4-6a^2b+9b^2)$

6. Solve and sketch the graph:

a.  $-(x^2 - 3x + 2)^2 = 0$

$x = 2, 1$  both double

y-int:  $(0, -4)$

degree: 4

extrema: 3

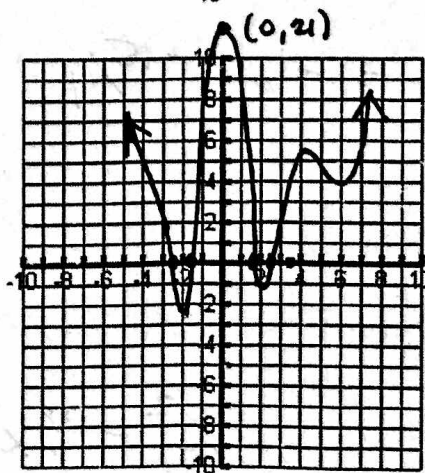
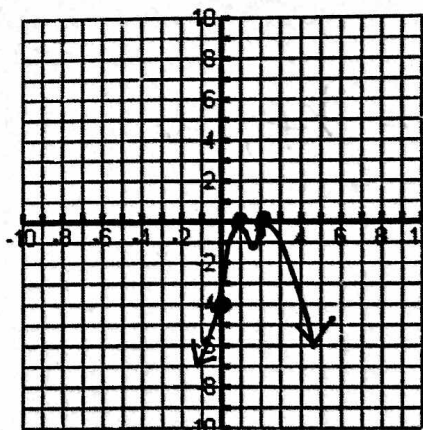
b.  $(x^2 - 3)^3 - 16(x^2 - 3) = 0$

$x = \pm\sqrt{3}, \pm\sqrt{7}, \pm i$

y-int:  $(0, 21)$

degree: 6

extrema: 5



7. Solve:

a.  $x^4 + 100 \geq 29x^2$

$$\{x \mid x \leq -5 \cup -2 \leq x \leq 2 \cup x \geq 5\}$$

b.  $(x^2 - x - 12)(x^2 - 7x - 8) < 0$

$$\{x \mid -3 < x < 1 \text{ or } 4 < x < 8\}$$

8. Given that  $\frac{3}{2}$  is a root of  $2z^3 + z^2 - 8z + 3 = 0$ , find the other roots.

$$x = \frac{3}{2}, -1 \pm \sqrt{2}$$

$$\frac{x^2 + x - 1}{x^2 + x - 3} + 2 + x^2 - 8x + 3$$

9. Find a polynomial equation with integral coefficients that has 3 and  $1 + 2i$  as roots.

$$x^3 - 5x^2 + 11x - 15 = 0$$

10. Find the number of times -2 is a root of  $P(x) = x^4 + 4x^3 - 16x - 16$ .

3 times (triple root)

11. Solve  $2x^3 - x^2 + 10x - 5 = 0$  given that  $i\sqrt{5}$  is a solution.

$$x = \frac{1}{2}, \pm i\sqrt{5}$$

12. Divide by long division:  $\frac{2x^4 - 3x^2 + 7x - 8}{x^2 + x - 3}$

$$2x^2 - 2x + 5 + \frac{-4x + 7}{x^2 + x - 3}$$

13. Find the value of  $k$  so that when  $2x^3 - 7x^2 + 4x + k$  is divided by  $x - 3$ , the remainder will be zero.

$$k = -3$$

14. Is  $x + 1$  a factor of  $x^{20} + 3x^7 - 4$ ? Why or why not?

No, because  $f(-1) \neq 0$

Questions 15-17, Consider the equation  $x^4 - 2x^3 - 6x^2 + 22x - 15 = 0$ .

15. List the possible rational roots.

$$\pm 1, 3, 5, 15$$

16. Solve the equation.

$$x = -3, 1, 2 \pm i$$

17. Sketch the function above. Include zeros, end behavior, degree and number of extrema.

$$y\text{-int } (0, -15)$$

degree 4

extrema 3

