**2CP Unit 4 Polynomials You Can/Review**

Make sure you can demonstrate each of the following skills. **Polynomials Test Part 1: No Calculator**

1. *Prove a polynomial identity*: $\left(x^{2}-5\right)^{2}=x^{4}-10x^{2}+25$

2. *Given a polynomial graph:*

* *Describe the lowest possible degree of the polynomial*
* *Determine if the leading coefficient is positive or negative*
* *Describe the domain and range using interval notation.*
* *Identify all absolute and relative maxima and minima*
* *Describe the end behavior using appropriate mathematical notation*
* *Identify where the function is increasing and decreasing, using interval notation.*
* *Identify where* $f\left(x\right)>0$ *and where* $f\left(x\right)<0$
* *Write a possible polynomial equation of the graph.*

a.



b.

3. *Sketch a polynomial by hand, showing the zeros, y-intercepts, end behavior, and general shape.*

$a. f\left(x\right)=x\left(x-5\right)(x-2)^{2}$ b. $g\left(x\right)=(x-5)(x^{2}-9)$ c. $h\left(x\right)=3x^{3}-20x^{2}-7x$

*4. Show that a given polynomial is a factor of a polynomial and find the remaining factors.*

a. $f\left(x\right)=x^{3}+5x^{2}+8x+4;(x+1)$ b. $f\left(x\right)=x^{3}-6x^{2}+11x-6;(x-2)$

*5. Find all complex solutions (real and imaginary), of a polynomial equation.*

a. $0=4x^{4}-25$ b. $0=2x^{4}+x^{2}-3$ c. $0=3x^{5}+4x^{3}-15x$

*6. Divide a polynomial using long division.*

$( x^{4}+2x^{2}-x-5)÷(x^{2}-x+1)$

**Polynomials Test Part II: Calculator**

1. *Find all possible rational roots of a polynomial function*. $f\left(x\right)=2x^{3}+7x-18$

2. *Find all zeros (real and imaginary) of a polynomial function.* (Hint: Use your graphing calculator to help you find a real, rational root, then go from there). $f\left(x\right)=x^{4}+x^{3}+2x^{2}+4x-8$

3. *Find all real zeroes of a polynomial using the graphing calculator and tell how many complex zeroes there are.*

a. $f\left(x\right)=x^{4}-2x^{2}+10x-2$ b. $f\left(x\right)=x^{3}+27$

4. Connect features of a polynomial graph with a real world situation it represents.

The percent of the US population born outside the United States from 1900 to 2000 can be modeled by the equation $f\left(x\right)=.00006t^{3}-0.007t^{2}+0.05t+14$ where t is the year since 1900.

a. Use your calculator to sketch a graph of the function.

b. During what year was the percentage of foreign born at a minimum? Label it on the graph.

c. During what years was the percentage of foreign born decreasing?

d. Would it be reasonable to use this model after the year 2000? Explain why.

*5. Solve an application such as the USPS or Red Vine Activity.*

***HAVE YOU:***

 **\* Reviewed your notes (read through all problems, redo problems you are not completely comfortable with, and practice the vocabulary)**

 **\*Reviewed all homework problems**

 **\* Completed additional practice problems?**

 **\*Come in for additional help if needed**

 **\* Investigated the online resources such as KhanAcademy.org?**