Name _____ Math 116 Ch 3 TEST FALL YELLOW

General Directions: EXACT = do NOT use any special buttons on your scientific calculator. Do NOT round unless otherwise indicated. Where necessary show all steps and work. No appropriate work = NO credit. If you need more space to work, write "See Back" and continue your work on the back side of each page. You may not use your text, nor notes, nor a friend.

#1. Make a reasonable sketch of each function. Show all zeros and y-intercept. Be sure your sketch clearly shows the behavior of the graph at any multiple zero.

1a) $y=(x-3)^2(x+1)^3$

1b) $y=x(2x+5)(x-4)^2$

#2. Use Synthetic Division (or synthetic substitution) to find $f(-2i)$**, if** $f(x)=2x^3+3x-7i$**. Do NOT simply plug in -2i.**

#2. $f(-2i)$ **=** _____

#3. Write an a quartic (degree 4) function that has integer coefficients, and has -3*i* and $2\sqrt{5}$ **as roots, and** $f(1)=190.$ **(Leave in factored form.)**

#4 . Use Synthetic Division, basic factoring, Rational Zero test, etc. to completely factor each. CIRCLE your final answer.

4a) $f(x)=2x^3+5x^2-x-6$

4b) $g(x)=x^4+3x^3+x^2-3x-2$

#5 – 6. For each problem: 1st – factor completely (by whatever method seems to work). Then find the zeros (note: Zeros are strictly Real numbers; not imaginary nor complex.)

#5. $f(x) = x^5 - 13x^3 + 45x$

#6. $f(x) = x^3 - 2x^2 - 36x + 72$

5) factored _____

6) factored _____

5) zeros _____

6) zeros _____

#7 – 10. SOLVE each. Your solutions may be Real and/or Complex. Place your final solutions in solution set notation. { }

#7. $x^4 + 6x^3 - 7x^2 - 16x - 4 = 0$

#8. $2x^3 + 9x^2 + 18x + 81 = 0$, if $3i$ is a root

#9. $x^3 - x = 6$

#10. $x^3 = 27$ hint: factor!!!!

#11. State the equation(s) of any vertical , horizontal asymptotes and/or 'slant' asymptotes. If no asymptote exists, write 'NONE' Show appropriate work for a 'slant' asymptote.

11a) $f(x) = \dfrac{x^2 - 3x + 7}{x^2 + 2x}$

Vert. _____ Horiz_____

Slant _____

11b) $f(x) = \dfrac{x^2 - 3x - 5}{x + 3}$

Vert. _____ Horiz _____

Slant _____

#12. Give the 'reduced' function, then state the Domain and the coordinates of any 'holes' if they exist.

$f(x) = \dfrac{x^3 + 4x^2 + 3x}{x^3 + 5x^2 + 6x}$

reduced $f(x)$ **= _____**

Domain = _____

Holes: _____

#13. Write the equation of any rational function that has y = 2 as its horizontal asymptote.

13) _____

#14. Sketch the graph of each. On your sketch, show and label all possible asymptotes, zeros, y-intercepts. Remember to indicate asymptotes as dotted lines, and label them with equations. Show appropriate work!

14a) $f(x) = \dfrac{2x+1}{5x+3}$

14b) $h(x) = \dfrac{x^2-4}{x-3}$