Alg II Day 1

A) Simplify

1) i^2

2) i^{43}

3) i^{672}

4) $\sqrt{-8}$

5) $\sqrt{-36}$

6) $(2+i)(3-i)$

7) $(3+i)^2$

8) $\frac{7}{2+i}$

9) $\sqrt{-12} + \sqrt{-18}$

10) $\frac{2+i}{5-i}$

B) Solve

11) $x^2+3x+2=0$

12) $x^2+4x+6=0$

13) $2x^2+6x-3=0$

14) $x^2-2x-9=0$

C) Divide

15) $x+2 \overline{)\, x^3+6x^2-3x-1}$

16) $x-3 \overline{)\, 2x^2-4x+1}$

17) $x+3 \overline{)\, x^3+5x^2-6x+2}$

18) $x-1 \overline{)\, 2x^2-8x+3}$

D) List the possible rational roots for each:

19) $x^3-3x^2+6x-8=0$

20) $5x^2-6x+1=0$

21) $2x^3-4x^2+6x-5=0$

Name:_____

Alg II – day 2

A. Simplify:

1. $\sqrt{-8}$
2. $\sqrt{-16}$
3. i^{43}
4. $(i+3)(i-5)$
5. $(2i+1)(3i-1)$
6. i^{67}
7. $i^3+i^4+i^5+i^6$
8. $\frac{7}{2i}$
9. $\frac{3}{i+3}$
10. $\frac{7+i}{4-i}$

B. Solve:

11. $x^2-4x+2=0$
12. $x^2+12x+35=0$
13. $2x^2-5x-3=0$
14. $x^2+7x-3=0$
15. $3x^2-9x+2=0$
16. $x^2+8x+1=0$
17. $8x^2-7x-3=0$

Notes For Algebra II

Polynomials:

Degree-

0	Constant
1	Linear
2	Quadratic
3	Cubic

Terms-

1	Monomial
2	Binomial
3	Trinomial

Expressions that are not a Polynomial – division, absolute value, square root of a variable (examples – $3/x$, $|x|$, $\sqrt{x}$)

Imaginary numbers:

$i^1 = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

$|a+bi| = \sqrt{a^2+b^2}$

$i = \sqrt{-1}$

Complex number form = a + bi

Quadratic Equations:

Any quadratic equations can be written as: $ax^2 + bx + c = 0$

Sum of roots = $\frac{-b}{a}$ Product of roots = $\frac{c}{a}$

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The **discriminant** $b^2 - 4ac$ will tell what kind of roots (solutions) the equation has.

If discriminant is
- positive, then there are 2 real, unequal solutions
- zero, then there is 1 real solution (repeated)
- negative, then there are 0 real solutions (2 imaginary, complex conjugate solutions)

Possible Rational Roots(PRR):

PRR = factors of the last term / factors of the first term

Alg II – day 3 Name:_____

A. Simplify:

1. $(3+i)(5-i)$
2. $8i^7$
3. $\frac{4}{2+3i}$
4. $\frac{3+i}{7-i}$
5. $(4+2i)(3-5i)$
6. i^{71637}

B. Solve:

$2x^2+5x-7=0$

$x^2+6x-8=0$

$x^2+5x+11=0$

C. Find the sum & product of the roots:

10. $x^2+7x-3=0$
11. $3x^2-9x+2=0$
12. $x^2+8x+1=0$
13. $8x^2-7x-3=0$

D. Write the quadratic equations with roots of:

14. $\{-5,-6\}$
15. $\{-1,9\}$
16. $\left\{\frac{3}{4},-\frac{1}{4}\right\}$
17. $\{-5,5\}$
18. $\{4+\sqrt{2},\_\_\_\_\}$
19. $\{3-4i,\_\_\_\_\}$

List the possible rational roots (PRR):

$x^3+2x^2-x-8=0$

$6x^3+5x^2+2x+10=0$

Use Descartes Rule of Signs to list the possible number of pos/neg real roots:

$x^3+4x^2+2x+3=0$

$3x^4-4x^3+2x^2+x-6=0$

Divide:

$x+2\overline{)x^3+6x^2-3x-1}$

$x-3\overline{)2x^3-7x^2-6x+8}$

Alg II – day 4 Name:_____

A. Simplify:

1. $\sqrt{-12}$

2. i^{73}

3. $(2+i)(3-i)$

4. $|2+3i|$

5. $\dfrac{2+i}{7-i}$

B. Find the sum & product of the roots:

6. $x^2-8x+5=0$

7. $3x^2+2x-5=0$

C. Write the quadratic equations with roots of:

8. { 7, -2 }

9. $\{2+\sqrt{7},\quad\}$

10. $\{3-i,\quad\}$

11. $\{\dfrac{1}{2},\dfrac{2}{5}\}$

F. Solve:

16. $x^3-5x^2-2x+24=0$

17. $2x^3-3x^2-2x+3=0$

18. $x^4-x^3-x^2-x-2=0$

Notes For Algebra II

Exponents:

$$x^{-n} = \frac{1}{x^n} \qquad x^{\frac{a}{b}} = \sqrt[b]{x^a}$$

Logs:

Log form to exp form: $\log_b x = y \Leftrightarrow b^y = x$

Some formulas:

$\log_b 1 = 0 \Rightarrow (b^0 = 1)$

$\log_b b = 1 \Rightarrow (b^1 = b)$

$\log_b b^x = x \Rightarrow (b^x = b^x)$

Properties:

1. $\log_b x + \log_b y = \log_b (xy)$
2. $\log_b x - \log_b y = \log_b (\frac{x}{y})$
3. $\log_b x^n = n \log_b x$

Change of base formula: $\log_b x = \frac{\log x}{\log b}$

Logarithms

Rewriting exponential expressions into equivalent logarithmic expressions.

General rule: $y = b^x$ is the same as $x = \log_b y$

Rewrite these exponentials into logarithmic form.

Example: $3^4 = 81$ becomes $\log_3 81 = 4$

1. $4^3 = 64$
2. $2^7 = 128$
3. $3^1 = 3$
4. $5^0 = 1$
5. $8^2 = 64$
6. $3^{-1} = 1/3$
7. $4^{-2} = 1/16$
8. $10^5 = 100{,}000$
9. $3^3 = 27$
10. $e^5 = 148.413$

Rewrite these logarithms into exponential form. See above example.

1. $\log_2 8 = 3$
2. $\log_3 9 = 2$
3. $\log_6 1/6 = -1$
4. $\log_4 8 = 3/2$
5. $\log 10000 = 4$
6. $\ln 4 = 1.386$
7. $\log_7 1 = 0$
8. $\log_2 64 = 6$
9. $\log_3 3 = 1$
10. $\log_8 16 = 4/3$

Solve for x: (hint: rewrite into exponential format.)
Example: $\log_x 36 = 2$ becomes $x^2 = 36$, so $x = 6$.

1. $\log_2 x = 5$
2. $\log_x 25 = 2$
3. $\log_4 16 = x$
4. $\log_3 x = 2$
5. $\log_x 7 = 1$
6. $\log_{14} 1 = x$
7. $\log_8 64 = x$
8. $\log_5 5 = x$
9. $\log_x 2 = .5$

10. $\log x = 3$

The three properties of logarithms are:

1. $\log (xy) = \log x + \log y$
2. $\log(x/y) = \log x - \log y$
3. $\log x^n = n \log x$

Expand these logarithms:
Example: $\log (x^3y^2) = \log x^3 + \log y^2 = 3 \log x + 2 \log y$.

1. $\ln (x^2y)$
2. $\log (10xy)$
3. $\log (x^3y/z)$
4. $\ln (x/y^2)$
5. $\ln ((xy^2))$

Contract these logarithms:
Example: $3 \log x - 2 \log y = \log x^3 - \log y^2 = \log (x^3/y^2)$

1. $\log 4 - \log x + 2 \log y$
2. $\log x + 2 \log y - \log z$
3. $\log (x + 1) + \log x$
4. $\ln x + 2 \ln y + 3 \ln z$

Using logs to solve exponential equations. Solve for x:

Example: $7^x = 17$
$\log 7^x = \log 17$
$x \log 7 = \log 17$ *(Rule 3)*
$x = (\log 17)/(\log 7)$
$x = 1.4559$

Check: $7^{1.4559} = 17$.

1. $5^x = 10$
2. $4^x = 18$
3. $2^x = 15$
4. $3^{(x+1)} = 15$
5. $e^{(2+x)} = 6$
6. $x = \log_3 11$ (rewrite into exponential form first!)
7. $x = \log_6 20$
8. $x = \log_2 512$
9. $x = \ln 5$
10. $4.5^x = 7.9$
11. $23e^{0.023x} = 76$
12. $1500e^{1.24x} = 1200$

Answers!

1. $\log_4 64 = 3$
2. $\log_2 128 = 7$
3. $\log_3 3 = 1$
4. $\log_5 1 = 0$
5. $\log_8 64 = 2$
6. $\log_3 (1/3) = -1$
7. $\log_4 (1/16) = -2$
8. $\log 10000 = 5$
9. $\log_3 27 = 3$
10. $\ln 148.413 = 5$

1. $2^3 = 8$
2. $3^2 = 9$
3. $6^{-1} = 1/6$
4. $4^{3/2} = 8$
5. $10^4 = 10000$
6. $e^{1.386} = 4$
7. $7^0 = 1$
8. $2^6 = 64$
9. $3^1 = 3$
10. $8^{4/3} = 16$

1. 32
2. 5
3. 2
4. 9
5. 7
6. 0
7. 2
8. 1
9. 4
10. 1000

1. $2 \ln x + \ln y$
2. $1 + \log x + \log y$
3. $3 \log x + \log y - \log z$
4. $\ln x - 2 \ln y$
5. $\ln x + 2 \ln y$

1. $\log (4y^2/x)$
2. $\log (xy^2/z)$
3. $\log (x^2 + x)$
4. $\ln (xy^2z^3)$

1. 1.431
2. 2.085
3. 3.908
4. 1.465
5. -.208
6. 2.183
7. 1.672
8. 9
9. 1.609
10. 1.374
11. 51.967
12. -1.8

Name:_____

Alg II – day 5

A. Simplify:

1. $\sqrt{-18}$

2. i^{7164}

3. $(5+i)^2$

4. $|3-i|$

5. $\dfrac{3+i}{4-i}$

B. Find the sum & product of the roots:

6. $2x^2-7x+1=0$

7. $5x^2+2x-6=0$

C. Write the quadratic equations with roots of:

8. $\{3, \dfrac{1}{5}\}$

9. $\{7-2i,\quad\}$

D. List the PRR, number of +/- real roots, & solve:

10. $x^3-2x^2-5x+6=0$

11. $x^3-x^2-9x+9=0$

12. $x^3-4x^2-5x+14=0$

E. Solve for x:

13. $\log_3 27 = x$

14. $\log_{10} .01 = x$

15. $\log_x 16 = 4$

16. $\log_{\frac{1}{8}} 4 = x$

17. $\log_2 16 = 2x - 1$

18. $\log_{25} x = \frac{3}{2}$

19. $\log_x 64 = \frac{2}{3}$

20. $\log_3 81 = x$

Evaluate Exactly:

$64^{\frac{-2}{3}} =$

$9^{\frac{-1}{2}} =$

$8^{\frac{-2}{3}} =$

$16^{-\frac{1}{4}} =$

$25^{-\frac{1}{2}} =$

$81^{\frac{3}{4}} =$

Divide by long or synthetic division:

$x-3\overline{)2x^3-6x^2-3x+1}$

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

Name:_____

Simplify:

1. $\sqrt{-20}$
2. i^{2463}
3. $|2+i|$
4. $(3+i)(7-i)$
5. $\frac{3}{i}$
6. $\frac{7+i}{3-i}$

Solve:

7. $x^2-9=0$
8. $x^2+3x+5=0$

Find x:

9. $\log_3 x=2$
10. $\log_x 625=4$
11. $\log_3 81=x$

Write as a single logarithm:

12. $\log x+\log(x-2)=$
13. $\log 7-\log 2=$
14. $\log_7 x+\log_7 3=$

Find x to the nearest hundredth:

15. $7^x=10$
16. $5^{3x}=17$
17. $\log x+\log(x+2)=\log 24$
18. $2^x=16$
19. $\log_{\frac{1}{4}} 8=x$

Alg II – day 7

Name:_____

A. Simplify:

1. i^{71677}
2. $\sqrt{-40}$
3. $\dfrac{7}{3-2i}=$
4. $|4-i|$
5. $3i(i-2)=$

B. Solve:

6. $2x^2+5x+3=0$
7. $x^2+2x+7=0$

C. Find x to the nearest hundredth:

8. $7^x=13$
9. $11^{x+2}=18$

D. Write as a single logarithm:

10. $\log 7+\log 3=$
11. $\log x-\log 2=$
12. $\log_7 y+\log_7 x=$

E. Find x:

13. $\log_9 27=x$
14. $\log_5 \dfrac{1}{25}=x$
15. $\log_{4x} 9=2$
16. $\log_3(2x+1)=4$

F. Find the sum & product of the roots:

17. $x^2+7x+2=0$
18. $3x^2-5x+3=0$

G. Write the quadratic equations with roots of:

19. $\{3,-8\}$
20. $\{2+\sqrt{7},2-\sqrt{7}\}$

H. List the PRR, number of +/- real roots, solve & Graph:

21. $2x^3-10x^2+9x-4=0$

Name:_____

Alg II – day 8 – 2005

Solve:

$x^2+6x+8\le 0$ $x^2-4x+4>0$ $x^2-5x+2<0$

Find the determinant:

$\begin{pmatrix}3 & 2\\ 4 & 5\end{pmatrix}$ $\begin{pmatrix}3 & -4\\ 1 & -3\end{pmatrix}$

$\begin{pmatrix}4 & 1 & 3\\ 7 & 2 & 0\\ 1 & -1 & 3\end{pmatrix}$ $\begin{pmatrix}1 & 3 & 2\\ -2 & 5 & -1\\ 0 & 6 & 2\end{pmatrix}$

Evaluate Exactly:

$8^{\frac{-2}{3}}=$ $16^{\frac{-3}{4}}=$ $1000^{\frac{-1}{3}}=$

Solve (to the nearest hundredth):

$3^x=13$ $2^x=27$ $3^x=17$

$6^{2x+1}=50$ $7^{x+2}=10$ $4^{5x-7}=191$

Alg II – day 9

Name:_____

A. Find the determinant:

1. $\begin{pmatrix} 3 & 2 \\ 4 & 5 \end{pmatrix}$

2. $\begin{pmatrix} 1 & 3 & 2 \\ -2 & 5 & -1 \\ 0 & 6 & 2 \end{pmatrix}$

B. Solve:

3. $x^2+6x+9 \geq 0$

4. $6x^2+8x+3<0$

5. $x^2+7x+1>0$

C. Simplify:

6. i^{41678}

7. $\sqrt{-44}$

8. $(3+i)^2$

9. $|2+5i|$

10. $\dfrac{3}{2-i}$

D. Find the sum & product of the roots:

11. $2x^2+5x-7=0$

12. $x^2+6x-8=0$

E. Write the quadratic equations with roots of:

13. $\{\, 3-\sqrt{5}, \quad \}$

14. $\{\, 5-2i, \quad \}$

F. Solve (to the nearest hundredth):

15. $13^x = 5$

16. $7^{x-3} = 12$

G. Evaluate (by hand):

17. $\log_x 125 = 3$

18. $\log_2 x = 4$

19. $\log_7 49 = x$

H. Write as a single logarithm:

20. $\log 20 - \log 10 =$

21. $\log 6 + \log 7 =$

22. $2\log 7 =$

23. $\frac{1}{2}\log_7 9 =$

I. Solve for x & y using Cramer's Rule:

24.
$$\begin{aligned} 3x + 2y &= 8 \\ 5x - 3y &= 7 \end{aligned}$$

J. List the PRR, number of +/- real roots, & solve:

25. $x^3 - 7x^2 + 14x - 8 = 0$