**Unit #6 Radicals and Complex Numbers and \*Unit #7 Transformations
 Reflective Portfolio**

**Section #1: Vocabulary**

**Define each:**

* **Redraw and label with the correct word (index, radicand, exponent, radical)**

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* **Imaginary Number:**

* **Complex Number:**
* **Conjugate:**
* **\*Even function:**
* **\*Odd function:**

**Section #2: Formulas/Equations/Rules**

* **When two conjugates are multiplied together, you always get a positive \_\_\_\_\_\_\_\_\_\_\_ number.**
* **If the roots are imaginary, they will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each other.**
* **Powers of *i* repeat in a definite cycle*: i0  = \_\_\_\_ i1 = \_\_\_ i2 = \_\_\_\_ i3 = \_\_\_\_***
* **Discriminant formula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Discriminant Rules: Complete the chart below!**

|  |  |  |  |
| --- | --- | --- | --- |
| **If the discriminant is** | **The roots will be** | **# of x-intercepts** | **Sketch the graph** |
| A negative number |  |  |  |
| zero |  |  |  |
| Positive perfect square |  |  |  |
| Positive non-perfect square |  |  |  |

**Example 1: Given the equation:**  Discriminant = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Describe the nature of the roots. b) Solve the equation. c) Sketch the graph.

**\*Transformation Rules:**

Ifis the original function, **explain in words what each transformation below will do to**. Let *c* stand for a positive real number.

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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  if $c>1 $\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 if $0<c<1$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

  if $c>1 $\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 if $0<c<1$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **\*Example 2:The function f(x) is graphed below. Graph g(x) and describe the transformation.**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. $g\left(x\right)=3f(x)$

Transformation: | 1. $h\left(x\right)=\frac{1}{2}f(x)$

Transformation: | 1. $j\left(x\right)=f(2x)$

Transformation: | 1. $k\left(x\right)=f(\frac{1}{2}x)$

Transformation: |

**\*Example 3: Evaluate Even and odd functions:**

|  |  |
| --- | --- |
| 1. f(x) = x4 **EVEN**

 $f\left(2\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$ $f\left(-2\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$  $f\left(x\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$ $f\left(-x\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$  | 1. f(x) = x5 **ODD**

 $f\left(2\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$ $f\left(-2\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$ $f\left(x\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$ $f\left(-x\right)= \\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$  |

**\*Example 4:Determine algebraically (test ) whether each of the following functions *is even, odd*, or *neither*. Then sketch each graph to verify. Justify graphically.**

1. $f\left(x\right)=x^{3}-x-2$ **B) f (x) = –3x2 + 4**

**Section #3: Key methods and concepts –Complete these specific examples!!!**

**Examples:**

* **5) How to simplify radicals (Write out the detailed steps for each example)**

 **a)  b)  c) **

* **6) How to add, subtract, multiply, divide radicals (rationalize denominator)**

 a) b)  c) 

* **7) How do you rationalize a denominator using the conjugate**



* **8) How to solve an equation containing a radical by isolating the radical**

 

* **How to simplify negative radicals**

**Always simplify negative radicals in terms of *i***

Examples: 9) a)  b) 

* **How to add, subtract, multiply, and divide(simplify) complex numbers**

Treat *i* as a normal variable, but always simplify powers of *i*
**Example 10:**

1. $\left(3-4xi\right)-(6-3xi)$ **b)** $\left(3-4xi\right)(6-3xi)$

$$c)\frac{3-4i}{6-3i}$$

* **How to simplify powers of** *i*

If a whole number exponent is divided by 4, the remainder is 0, 1, 2, or 3.

We can simplify powers of *i* by using the remainders after dividing by 4.

Example 11: a) *i* 105 =  b)*i* 64=

* **12) Multiplying conjugate pairs (5 + 3***i***)( 5 - 3***i***)=**

Answers: 1) a) imaginary b) $1\pm \sqrt{7}i$ c) graph 2) a) v.s.by 3 b) v.c. by 2 c) h.c. by 2 d) h.s. by 2

3) a) 16, 16, $x^{4}$, $x^{4}$ b) 32, -32, $x^{5}$,$ -x^{5}$ 4) a) neither b) even 5) a) $4\sqrt{3}$ b) $2\sqrt[3]{6}$ c) $2\sqrt[4]{3}$

6) a) $10x^{3}\sqrt[3]{x^{2}}$ b) $3x\sqrt[3]{2x}$ c) $5\sqrt[3]{x}+2\sqrt[3]{2x}$ 7) $\frac{22-19\sqrt{2}}{-34}$ 8) $r=10$ 9) a) $2i$ b) $3\sqrt{2}i$

10) a) $-3-xi$ b) $18-33xi-12x^{2}$ c) $\frac{2}{3}-\frac{1}{3}i$ 11) a) $i$ b) 1 12) 34