

Intro Ch1 sec 5-6 Quiz Outline

1. Evaluate the expression  $i^{63}$  and write the result in the form  $a + bi$ . Know Powers of  $i$

$i^{63} \approx i^3$  so,  $i^{63} = -i$

$i^0 = 1$      $i^2 = -1$   
 $i^1 = i$      $i^3 = -i$

2. Evaluate the expression  $(6 + 2i) + (13 - 7i)$  and write the result in the form  $a + bi$ . (add)

$$6 + 13 + 2i - 7i$$

$$\boxed{19 - 5i}$$

3. Perform the subtraction and write the result in the form  $a + bi$ .

$$(2 + \frac{3}{2}i) - (5 + \frac{9}{2}i)$$

Dist.

$$2 + \frac{3}{2}i - 5 - \frac{9}{2}i$$

$$2 - 5 + \frac{3}{2}i - \frac{9}{2}i$$

$$-3 - \frac{6}{2}i$$

$$\boxed{-3 - 3i}$$

4. Evaluate the expression  $(4 + 6i)(2 - 3i)$  and write the result in the form  $a + bi$ . (multi.)

$$(4 + 6i)(2 - 3i)$$

$$8 - 12i + 12i - 18(i^2)$$

$$8 - 18(-1)$$

$$8 + 18 = \boxed{26}$$

5. Evaluate the expression  $\frac{2 + 2i}{1 - 3i}$  and write the result in the form  $a + bi$ . (div.)

$$\frac{2 + 2i}{1 - 3i} \cdot \frac{1 + 3i}{1 + 3i}$$

Multiply top and bottom

$$\frac{(2 + 2i)(1 + 3i)}{(1 - 3i)(1 + 3i)}$$

$$\frac{2 + 6i + 2i + 6(i^2)}{1 + 3i - 3i - 9(i^2)}$$

$$\frac{2 + 8i + 6(-1)}{1 - 9(-1)^2}$$

$$\frac{2 - 6 + 8i}{1 + 9}$$

$$\frac{-4 + 8i}{10}$$

$$-\frac{4}{10} + \frac{8}{10}i$$

$$\boxed{-\frac{2}{5} + \frac{4}{5}i}$$

6. Find all solutions of the equation  $6x^2 + 12x + 7 = 0$  and express them in the form  $a + bi$ .

$$6x^2 + 12x + 7 = 0$$

$$\frac{-(12) \pm \sqrt{(12)^2 - 4(6)(7)}}{2(6)}$$

quad. formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2(a)}$$

$$\frac{-12 \pm \sqrt{144 - 168}}{12}$$

$$-\frac{12}{12} \pm \frac{\sqrt{-24}}{12}$$

$$-1 \pm \frac{\sqrt{4} \sqrt{6} i}{12}$$

$$-1 \pm \frac{2i\sqrt{6}}{12} = -1 \pm \frac{i\sqrt{6}}{6}$$

7. Find all real solutions of the equation.

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

$$x(x^2 - 5x + 6) = 0$$

$$x(x-3)(x-2) = 0$$

Z.P.P.

$x=0$     $x-3=0$     $x-2=0$   
 $x=3$     $x=2$

8. Find all real solutions of the equation.

$$\sqrt{x+1} + 1 = x$$

$$\sqrt{x+1} = x-1 \quad \text{Square both sides}$$

$$(\sqrt{x+1})^2 = (x-1)^2 \quad \text{Sides}$$

$$x+1 = (x-1)(x-1)$$

$$x+1 = x^2 - 2x + 1$$

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

$$0 = x(x-3)$$

Z.P.P.

only solution

Not a solution  $\rightarrow$   ~~$x=0$~~     $x-3=0$   
 $x=3$

Check solutions

Let  $x=0$

$$\sqrt{0+1} + 1 = 0$$

$$1+1 \neq 0$$

Let  $x=3$

$$\sqrt{3+1} + 1 = 3$$

$$\sqrt{4} + 1 = 3$$

$$2+1 = 3 \quad \checkmark$$

9. Find all real solutions of the equation.

$$\left( \frac{10}{x} - \frac{12}{x-3} + 4 = 0 \right) x(x-3)$$

$$10(x-3) - 12(x) + 4(x)(x-3) = 0$$

$$10x - 30 - 12x + 4x(x-3) = 0$$

$$10x - 30 - 12x + 4x^2 - 12x = 0$$

$$4x^2 - 14x - 3 = 0$$

$$\frac{-(-14) \pm \sqrt{(-14)^2 - 4(4)(-3)}}{2(4)}$$

$$= \frac{14 \pm \sqrt{196 + 48}}{8}$$

$$\frac{7}{4} \pm \frac{\sqrt{244}}{8} = \boxed{\frac{7}{4} \pm \frac{\sqrt{61}}{4}}$$

$$\frac{244}{\sqrt{4}\sqrt{61}}$$

10. Find all real solutions of the equation.

$$(x+5)^2 - 3(x+5) - 10 = 0$$

Let  $u = x+5$ ,

then

$$u^2 - 3u - 10 = 0$$

$$(u-5)(u+2) = 0$$

$u =$

$$u = 5 \text{ or } u = -2$$

$$x+5 = 5 \quad x+5 = -2$$

$$\boxed{x = 0}$$

$$\boxed{x = -7}$$