Mth 28, Homework 10 on sections 8.8, 9.1, 9.2

Due by Wed, Apr 17.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 2 points.

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(1) Say if these are true or false (don't go too fast!):

(a) $\sqrt{-1} = i$ **(b)** $i = -1$ **(c)** i is a real number **(d)** $i^2 = 1$

(2) Write using i and simplify:

(a) $\sqrt{-16}$ **(b)** $-2\sqrt{-18}$ **(c)** $\sqrt{-8}\sqrt{-50}$

(Use that $\sqrt{-x} = \sqrt{x}\, i$ whenever $x \geqslant 0$.)

(3) Simplify:

(a) $(3 + 4i) + (-4 + i)$

(b) $(3 + 4i) - (-4 + i)$

(c) $7 + 3i - 4i^2 - 11 + 2i$

(Hint: combine like terms and use that $i^2 = -1$.)

(4) Simplify:

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

(b) $(4 + 7i)(4 - 7i)$

(Hint: now we are multiplying. Show that the answer to part (a) is $10 - 5i$. The answer to part (b) should be a real number.)

(5) Divide and write the answer in the standard form $a + bi$: $\dfrac{7 - i}{1 + 2i}$

(6) Compute:

(a) i^3 **(b)** i^{16} **(c)** i^{266}

(The powers of i repeat since $i^4 = 1$. For large powers, divide by 4 and see what the remainder is.)

(7) Solve using the square root property:

(a) $x^2 = 5$ **(b)** $-3x^2 = -21$

(8) Solve using the square root property:

(a) $\frac{1}{2}x^2 - 4 = 0$

(b) $y^2 + 63 = 0$

(Make sure any radicals in your answers are simplified. Any square roots of negative numbers should be written using i.)

(9) Solve: $3x^2 + 10 = 26$

(10) Solve: $(x-4)^2 - 18 = 0$

(For this one, don't multiply out $(x-4)^2$. Instead, move the 18 to the other side and then use the square root property.)

(11) Find the number to be added to each of these expressions to complete the square:

(a) $x^2 - 18x$ **(b)** $x^2 + x$

(Remember, to complete the square for $x^2 + bx$ you need $(b/2)^2$.)

(12) Fill in the blanks: $x^2 + 10x + (\quad) = (x+\quad)^2$

(13) Solve by completing the square: $x^2 + 6x = 1$

(Hint: complete the square on the left and add the same number to the right. Then write the left side as $(x + number)^2$ and finally use the square root property to get the solutions.)

(14) Solve by completing the square: $x^2 + 4x + 5 = 0$

(Make sure any square roots are simplified and write with i if it's the square root of a negative.)

(15) Solve by completing the square: $3x^2 - 3 = 42x$

(Did you get $x = 7 \pm 5\sqrt{2}$?)

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.