Mth 28, Homework 9 on sections 8.8, 9.1, 9.2

Due by Wed, Nov 26.

Write all your working out and answers neatly, using lots of space between questions, and showing your steps clearly. Each exercise is worth 2 points.

Section 8.8 Complex numbers

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

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

(Show that the answer to part (a) is $6 - 3i$. The answer to part (b) should be a real number.)

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

(Hint: just like if we had for example $1 + 2\sqrt{3}$ on the bottom, multiply top and bottom by the conjugate of the bottom. That's $1 - 2i$ here.)

(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.)

Sections 9.1, 9.2 Solving quadratic equations

(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: $x^2 + 10x + (\quad) = (x + \quad)^2$

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 11:30 - 12:30, Wed 11:30 - 12:30 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.