

# Complex Numbers: math test, Grade 11 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

## 1 Radicals and powers of $i$

/ 4 pts

No calculator. Simplify. (a)  $\sqrt{-98}$  (b)  $i^{58}$  (c)  $i^{83}$  (d)  $i^7 \cdot i^{12}$

## 2 Operations

/ 4 pts

Write each result in the form  $a + bi$ . (a)  $(7 - 3i) + (-2 + 8i)$  (b)  $(6 + i) - (4 - 5i)$  (c)  $(3 - 4i)(2 + 5i)$  (d)  $(4 - 3i)^2$

## 3 Quotients

/ 3 pts

Write in the form  $a + bi$ . (a)  $\frac{10}{3 - i}$  (b)  $\frac{11 + 2i}{1 + 2i}$

## 4 Quadratic equations

/ 4 pts

Solve over the complex numbers. (a)  $x^2 + 75 = 0$  (b)  $x^2 - 8x + 25 = 0$  (c) Check your answers to (b) with the sum and the product of the roots.

### 5 Complex plane

/ 3 pts

Let  $z_1 = -3 + 4i$  and  $z_2 = 2 - i$  be two points of the complex plane. (a) Find  $|z_1|$ . (b) Give the conjugate of  $z_2$  and describe where it is located compared with  $z_2$ . (c) Find the distance between  $z_1$  and  $z_2$ .

### 6 Find the number

/ 2 pts

Find the complex number  $a + bi$  (with  $a$  and  $b$  real) such that  $(a + bi)(1 - 2i) = 7 - 4i$ .



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