Questions from Homework

① b) $i^7 + i^{23} + i^{94} + i^{112}$

$(i^4)(i^3) + (i^{20})(i^3) + (i^{92})(i^2) + 1$

$(1)(-i) + (1)(-i) + (1)(-1) + 1$

$-i - i - 1 + 1$

$-2i$

① c) $(\sqrt{-16})(\sqrt{-49})(\sqrt{-27})(\sqrt{-12})$

$(4i)(7i)(3i\sqrt{3})(2i\sqrt{3})$

$168\,\underline{i^4}(3)$

$168(1)(3)$

504

② a) $-5-12i$

$a=-5 \quad b=-12$

$$|z| = \sqrt{a^2+b^2}$$
$$= \sqrt{(-5)^2+(-12)^2}$$
$$= \sqrt{25+144}$$
$$= \sqrt{169}$$
$$= 13$$

② c) $-\sqrt{5} + i\sqrt{11}$

$a = -\sqrt{5} \quad b=\sqrt{11}$

$$|z| = \sqrt{a^2+b^2}$$
$$= \sqrt{(-\sqrt{5})^2+(\sqrt{11})^2}$$
$$= \sqrt{5+11}$$
$$= \sqrt{16}$$
$$= 4$$

③ $z = 5-11i$

a) $\bar{z} = 5+11i$

b) $z+\bar{z}$

$5-11i+(5+11i)$

$5-11i+5+11i$

10

c) $z-\bar{z}$

$5-11i-(5+11i)$

$5-11i-5-11i$

$-22i$

④

Number	"a"	"b"	(a, b) OP	Modulus
$\sqrt{7}-\sqrt{-36}$ $\sqrt{7}-6i$	$\sqrt{7}$	-6	$(\sqrt{7},-6)$	$\lvert z\rvert=\sqrt{7+36}$ $=\sqrt{43}$
$3i$	0	3	$(0,3)$	$\lvert z\rvert=\sqrt{0+9}$ $=3$

Positive Powers of "i"

$$i^1 = i$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

Negative Powers of "i"

$$i^{-1} = -i$$

$$i^{-2} = -1$$

$$i^{-3} = i$$

$$i^{-4} = 1$$

Notice a pattern?

For positive powers take out the largest multiple of 4
For negative powers take out the largest multiple of -4

Examples

$i^1 = i$
$i^2 = -1$
$i^3 = -i$
$i^4 = 1$

$i^{-1} = -i$
$i^{-2} = -1$
$i^{-3} = i$
$i^{-4} = 1$

$$i^8 + i^{33} + i^{83} - i^{132}$$

$1 + (i^{32})(i^1) + (i^{80})(i^3) - 1$

$1 + i + (-i) - 1$

0

$$i^{-9} + i^{-28} + i^{-83} - i^{-129}$$

$(i^{-8})(i^{-1}) + 1 + (i^{-80})(i^{-3}) - (i^{-128})(i^{-1})$

$-i + 1 + i + i$

$1 + i$

Simplify the following!

$$\frac{(2+3i)(3-i)}{(1-5i)(2+4i)}$$

$$\frac{6-2i+9i-3i^2}{2+4i-10i-20i^2}$$

$$\frac{6+7i+3}{2-6i+20}$$

$$\frac{(9+7i)}{(22-6i)}\frac{(22+6i)}{(22+6i)}$$

$$\frac{198+54i+154i+42i^2}{484-36i^2}$$

$$\frac{198+208i-42}{484+36}$$

$$\frac{156+208i}{520}$$

$$\frac{156}{520}+\frac{208i}{520}$$

$$\boxed{\frac{3}{10}+\frac{2i}{5}}$$