Exercise 2.5

Q1. Evaluate

(i) i^7

$= i^6 . i$

$= \left(i^2\right)^3 . i$

$= (-1)^3 . i$

$= -1 . i$

$= -i$

(ii) i^{50}

$= \left(i^2\right)^{25}$

$= (-1)^{25}$

$= -1$

(iii) i^{12}

$= \left(i^2\right)^6$

$= (-1)^6$

$= 1$

(iv) $(-i)^8$

$= i^8$

$= \left(i^2\right)^4$

$= (-1)^4$

$= 1$

(v) $(-i)^5$

$= -i^5$

$= -\left(i^4 . i\right)$

$= -\left(\left(i^2\right)^2 . i\right)$

$= -\left((-1)^2 . i\right)$

$-(i)$

$= -i$

(vi) i^{27}

$= i^{26} . i$

$= \left(i^2\right)^{13} . i$

$= (-1)^{13} . i$

$= (-1)i$

$= -i$

Q2. Write the conjugate of the following numbers.

(i) $2+3i$

Let $z = 2+3i$

then $\bar{z} = 2-3i$

(ii) $3-5i$

Let $z = 3-5i$

$\bar{z} = 3+5i$

(iii) $-i$

Sol: Let $z = 0-i$

then $\bar{z} = 0+i = i$

(iv) $-3+4i$

Let $z = -3+4i$

then $\bar{z} = -3-4i$

(v) $-4-i$

Let $z = -4-i$

then $\bar{z} = -4+i$

vi) $i-3$

Let $z = -3+i$

then $\bar{z} = -3-i$

Q3. Write the real and imaginar part of the following numbe

(i) $1+i$

Let $z = 1+i$

$\text{Re}(z) = 1,\ \text{Im}(z) = 1$

(ii) $-1+2i$

Let $z = -1+2i$

$\text{Re}(z) = -1,\ \text{Im}(z) = 2$

(iii) $-3i+2$

Let $z = 2-3i$

$\text{Re}(z) = 2,\ \text{Im}(z) = -3$

(iv) $-2-2i$

Let $z = -2-2i$

$\text{Re}(z) = -2,\ \text{Im}(z) = -2$

(v) $-3i$

Let $z = 0-3i$

$\text{Re}(z) = 0,\ \text{Im}(z) = -3$

(vi) $2+0i$

Let $z = 2+0i$

$\text{Re}(z) = 2,\ \text{Im}(z) = 0$

Q4. Find the value of x and y if

$x+iy+1 = 4-3i$

Sol: $x+iy+1 = 4-3i$

$x+iy = 4-1-3i$

$x+iy = 3-3i$

Two complex numbers are equal if the real and imaginary parts are equal

So $x = 3$ and $y = -3$