Express the following complex numbers in the standard form:

1. $(1 + i)(1 + 2i)$ ans: $-1 + 3i$

2. $\dfrac{(1+i)(1+2i)}{2+i}$ ans: $(1 + 7i)/5$

3. $\dfrac{(2+3i)}{4+5i}$ ans: $(23 + 2i)/41$

4. $(1+3i)^3$ ans: $-26 - 18i$

Find values of x and y:

5. $(x + iy)(2 - 3i) = 4 + i$ ans: $(5 + 14i)/13$ $x = 5/13$ and $y = 14/13$
6. $(3x + 2iy)(2 + i)^2 = 10(1 + i)$ ans: $x = 14/15$ and $y = -1/5$
7. $(1 + i)(x + iy) = 2 - 5i$ ans: $x = -3/2$ and $y = -7/2$

8. if $Z_1 = 3 + 4i$ and $Z_2 = 4 + 3i$ find a) $-Z_1$ b) $\overline{Z_2}$ ans: a) $-3 - 4i$ b) $4 - 3i$

      Prove the following if $Z_1 = 3 + 4i$ and $Z_2 = 4 + 3i$

9. $\overline{Z_1 + Z_2} = \overline{Z_1} + \overline{Z_2}$ etc. (try the other qns yourself)

Express the following in polar form (modulus amplitude form)

10. $1 + i$ ans: $\sqrt{2}\left(\cos\dfrac{\pi}{4} + i\sin\dfrac{\pi}{4}\right)$

11. $-1 + i$ ans: $\sqrt{2}\left(\cos\dfrac{3\pi}{4} + i\sin\dfrac{3\pi}{4}\right)$

12. $1 + \sqrt{3}i$ ans: $2\left(\cos\dfrac{\pi}{3} + i\sin\dfrac{\pi}{3}\right)$

13. $-\sqrt{3} + i$ ans: $2\left(\cos\dfrac{5\pi}{6} + i\sin\dfrac{5\pi}{6}\right)$

14. $-4 - 4i$ ans: $4\sqrt{2}\left(\cos\left(\dfrac{-3\pi}{4}\right) + i\sin\left(\dfrac{-3\pi}{4}\right)\right)$

15. Simplify $i^3 + \dfrac{1}{i^3}$ ans: 0

16. Prove that $(2 + 3i)^2 = -5 + 6i$
17. Find the value of x and y if $(x + iy)(3 + 2i) = 1 + i$ ans: $x = 5/13$ and $y = 1/13$