Complex Number

1. What is the imaginary unit i equal to?
2. What is the modulus of the complex number $z = 3 + 4i$?
3. What is the conjugate of $z = 2 + 5i$?
4. What is the polar form of $z = 1 + i$?
5. What is i^3 equal to?
6. What is the argument of $z = -1$?
7. What is Euler's formula?
8. What is the result of adding $z_1 = 2 + 3i$ and $z_2 = 4 - i$?
9. What is the product of $z_1 = 1 + i$ and $z_2 = 2 + 3i$?
10. What is the division of $z_1 = 1 + i$ by $z_2 = 1 - i$?
11. Find the distance between $z_1 = 1 + i$ and $z_2 = 2 + 2i$.
12. What is the exponential form of $z = 1 + i$?
13. What is the value of z^0 for any non-zero complex number z?
14. How many distinct solutions are there to $z^4 = 1$?
15. What is the argument of $z = i$?
16. What is the result of subtracting $z_2 = 3 - 2i$ from $z_1 = 5 + 4i$?
17. Find the roots of unity for $z^3 = 1$.
18. What is the inverse of $z = 1 + 2i$?
19. What is De Moivre's theorem for $z = e^{i\theta}$?
20. What is the modulus of the product $z_1 = 2 + i$ and $z_2 = 1 + 2i$?

Key:

1. $i = \sqrt{-1}$
2. $\sqrt{3^2 + 4^2} = 5$
3. $2 - 5i$
4. $r = \sqrt{2}, \theta = \frac{\pi}{4}$, so $z = \sqrt{2}(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4})$
5. $-i$
6. π
7. $e^{i\theta} = \cos\theta + i\sin\theta$
8. $6 + 2i$
9. $-1 + 5i$
10. $-i$
11. $\sqrt{2}$
12. $z = \sqrt{2}e^{i\frac{\pi}{4}}$
13. 1
14. 4 distinct solutions
15. $\frac{\pi}{2}$
16. $2 + 6i$
17. $z_k = e^{2k\pi i/3}, k = 0, 1, 2$
18. $z^{-1} = \frac{1-2i}{5}$
19. $(e^{i\theta})^n = e^{in\theta}$
20. $\sqrt{5} \times \sqrt{5} = 5$