Simplify each and express the radical in terms of j.

1. = 7j 2. ( ) 2 = -10

3. 4. 10j

3j

5. j21 j 6. -3j ( 4 + 6j) = 18 -12j

7. = 8. -12j

-60i

9. What is the complex conjugate of 4 + 8j?

4-8j

Perform the indicated operations. Express your answer in the a + bj form.

10. ( 12 + 9j) + ( -3 + 5j)

9 + 14j

11. ( 11 – 4j) + ( 3 – 12j )

14 – 16j

12. ( 3 – 7j) - ( 25 + 7j)

-22 -14j

13. ( 14 + 3j) – ( 17 - ) 6j

-3 + 9j

14. ( 3 – 2j) ( 4 + 5j)

12 + 15j – 8j – 10j 22 + 7j

15. ( 6 – 2j) ( 5 + 3j)

30 + 18j -10j +6 36 + 8j

16. ( 1 + 3j) 2

1 + 3j + 3j – 9 -8 + 6j

17. x 2-2j

8 - 8j -6j -6 2 - 14j

8 8

Express the following in rectangular form.

18. 12 ( cos 20° + j sin 20° )

11.28 + 4.10j

19. 23 301°

11.85 – 19.71

Express the following in polar form.

20. – 7 – 12 j

13.89 L 210.26

21. – 15

15 L 180

Perform the indicated operations and write the answer in polar form.

22. ( 12 140° ) ( 3 20°)

23.

24.

25.

26. [ 4 ( cos 30° + j sin 30° ) ]3

27. 7 68° + 10 192°

28. Ohm’s law for alternating current states that for a current with voltage V, current I, and impedance Z, V = IZ. If current is I= 9 + 3j and the voltage is V = 5 - 7j, what is the impedance?

29. Find the total impedances if the give impedances are connected in series.

Z1 = 44.5 + 7j

30. Find the total impedances if the given impedances are connected in parallel.

Z1 = 12

31. Ohm’s law for alternating current states that for a current with voltage V, current I, and impedance Z, V = IZ. If current is I= 12 and the impedance is Z =, what is the voltage?

32. Find the total impedances if the give impedances are connected in series.

Z1 = 12

33. Find the total impedances if the given impedances are connected in parallel.

Z1 = 12