EXERCISES 4.2

In Problems 1–6, find all values of the given complex power.

1. $(-1)^{3i}$

2. $3^{2i/\pi}$

3. $(1+i)^{1-i}$

4. $\left(1+\sqrt{3}i\right)^{i}$

5. $(-i)^{i}$

6. $(ei)^{\sqrt{2}}$

In Problems 7–12, find the principal value of the given complex power.

7. $(-1)^{3i}$

8. $3^{2i/\pi}$

9. 2^{4i}

10. $i^{i/\pi}$

11. $\left(1+\sqrt{3}i\right)^{3i}$

12. $(1+i)^{2-i}$

13. Verify that $\dfrac{z^{\alpha_1}}{z^{\alpha_2}} = z^{\alpha_1-\alpha_2}$ for $z \neq 0$.

14. (**a**) Verify that $(z^{\alpha})^{n} = z^{n\alpha}$ for $z \neq 0$ and n an integer.

(**b**) Find an example that illustrates that for $z \neq 0$ we can have $(z^{\alpha_1})^{\alpha_2} \neq z^{\alpha_1\alpha_2}$.

Let z^{α} represent the principal value of the complex power defined on the domain $|z| > 0$, $-\pi < \arg(z) < \pi$. In Problems 15–18, find the derivative of the given function at the given point.

15. $z^{3/2};\ z = 1+i$

16. $z^{2i};\ z = i$

17. $z^{1+i};\ z = 1+\sqrt{3}i$

18. $z^{\sqrt{2}}; z = -i$