Simplify each of the following expressions.

1) $3^{\sqrt{2}}\cdot 3^{2\sqrt{2}}$

2) $\left(4^{\sqrt{3}}\right)^{\sqrt{3}}$

3) $9^{\pi/2}$

4) $\dfrac{5^{\sqrt{3}+6}}{125}$

5) $\left(\sqrt{2}\right)^{\sqrt{3}}\left(\sqrt{2}\right)^{-\sqrt{3}}$

6) $\dfrac{3^{\sqrt{3}}\cdot 3^{\sqrt{27}}}{3^{2\sqrt{3}}}$

7) $\left(16^{3\sqrt{2}/8}\right)^{\sqrt{2}}$

8) $\left(2^{-2\sqrt{3}}\right)^{\sqrt{3}}$

9) $4^{3x-1}\cdot 8^{x+2}\cdot 16^{x}$

10) $\dfrac{\left(\sqrt{5}-1\right)^{2+\pi}}{\left(\sqrt{5}-1\right)^{\pi}}$

For numbers 11-14 solve the equations by getting the bases to match and using the one-to-one property.

11) $4^{3x+2}=4^{x-6}$

12) $27^{2x-1}=9^{x+5}$

13) $\left(\dfrac{1}{4}\right)^{4x-3}=8^{2x+1}$

14) $64^{7x-4}=2\cdot 8^{x-1}$