Homework 22 Solutions

Problems

1. **Compute the following roots:**

   (a) **The 3rd root of 7** $\pmod{11}$

   $1/3 = 7 \pmod{10}$. So $7^{1/3} = 7^7 \pmod{11}$ and you can compute this by doubling to find that $7^7 \equiv \boxed{6}$.

   (b) **The 7th root of 3** $\pmod{13}$

   $1/7 = 7 \pmod{12}$. So $3^{1/7} = 3^7 \pmod{13}$ and now use doubling to find that $3^7 \equiv \boxed{3}$.

   (c) **The 33rd root of 8** $\pmod{17}$

   $1/33 = 1/1 = 1 \pmod{16}$. So $8^{1/33} = 8^1 = \boxed{8} \pmod{17}$