1. (a) $\boxed{5^3 \cdot 7^3}$
   (b) $\boxed{5^5 \cdot 7^5 \cdot 11^4}$
   (c) $\boxed{a^3 \cdot b^2 \cdot x}$
2. (a) $3^2 \cdot 3^3 \cdot 3^5 = 3^{2+3+5} = \boxed{3^{10}}$
   (b) 3^{3^3}. Remember order of operations. Start with the highest exponent: $3^{(3^3)} = 3^{27}$. $\boxed{3^{27}}$
   (c) $\boxed{2^7 \cdot 3^5 \cdot 5^8}$
   (d) $2^{2^{2^2}} \times (3^0)^2 = 2^{2^{(2^2)} \times (1)^2 = 2^{(2^4)} \times 1 = 2^1 6 \times 1 =}$ $\boxed{2^{16}}$
3. LCM(2,3,4,5,6,7) = 420. However, we need a 4-digit number. Check the multiples of 420: 840 (still not 4 digits), 1260 (4 digits). $\boxed{1260}$
4. $\boxed{n = 12}$
5. $(2^3)^{(2^3)} = (2^3)^8 = 2^{3 \times 8} = 2^{24}$ $\boxed{N = 24}$
6. In the expression $5^3 + 5^3 + 5^3 + 5^3 + 5^3$, we have 5 sets of 5^3. So we can rewrite it $5 \times 5^3 = 5^1 \times 5^3 = 5^{3+1} = 5^4 =$ $\boxed{625}$
7. $21^6 = 3^6 \times 7^6$. We are missing 2 3's and a 7. So $n = 3^2 \times 7 =$ $\boxed{63}$
8. $\dfrac{11^6}{11^5 + 11^5} = \dfrac{11^6}{2 \times 11^5} = \dfrac{11}{2} =?$ $\boxed{5.5}$
9. $6^3 + 6^3 + 6^3 + 6^3 + 6^3 + 6^3 = 6 \times (6^3) = 6^4 = 6^x$, so $x = 4$. $2^2 + 2^2 = 2(2^2) = 2^3 = 2^y$, so $y = 3$. Then $x^y = 4^3 =?$ $\boxed{64}$
10. $(2^{0.5})(2^{0.3})(2^{0.1})(2^{0.8})(2^{0.3}) = 2^{0.5+0.3+0.1+0.8+0.3} = 2^2 =$ $\boxed{4}$