More examples

Problem 9: Prove that $24|(5^{2n} - 1)$ for all integers $n \geq 0$.

Problem 21: Prove that

$$\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{2^n - 1} + \frac{1}{2^n} \geq 1 + n/2$$

and conclude that the harmonic series diverges.