CSC 4-151 Discrete Mathematics for Computer Science
Quiz 5 December 11, 2014

solution
Name

1. (4 pts.) Using the Euclidean Algorithm, find gcd(185,407).

$$\begin{array}{r} 2 \\ 185\overline{)\,407} \\ 370 \\ \hline 37 \end{array} \qquad \begin{array}{r} 5 \\ 37\overline{)\,185} \\ 185 \\ \hline 0 \end{array}$$

2. (6 pts.) Using the Principle of Mathematical Induction, prove
   $1 + 2 + 4 + \ldots + 2^n = 2^{n+1} - 1$, for $n \geq 0$.

I Basis. The result holds when $n=0$ since $1 = 2^1 - 1$

II Assume $1+2+\cdots+2^k = 2^{k+1} - 1$ for $k \geq 0$.

want to show $1+2+\cdots+2^k+2^{k+1} = 2^{k+2} - 1$

$$1+2+\cdots+2^k+2^{k+1} = (2^{k+1}-1)+2^{k+1} \quad \text{by the IH}$$
$$= 2 \cdot 2^{k+1} - 1$$
$$= 2^{k+2} - 1 \quad \text{as desired}$$