# CS4321 QUIZ 1 (9/14)

**NAME** ( 5 points):

Answer the following questions based on the program below (5 points).

```
int power2(int n) // n >= 0
{
    int p = 1;

    for (i = 1; i <= n; i++)
        p *= 2;

    return p;
}
```

1.  What is the value of p just before the "for" starts?  [      ]
    Is the value equal to $2^0$?    [      ]

2.  Assuming that the value of p is $2^{i-1}$ just before the $i^{th}$ loop iteration starts, what is the value of p when the $i^{th}$ loop iteration finishes? [      ]

3.  Based on your arguments in questions 1 and 2, what loop invariant can you come out for the "for" loop, i.e., what is $S_i$? [              ]
    (Note: $S_{i-1}$ is a statement that is always true (invariant) just before the $i^{th}$ iteration; $S_i$ is a statement that is always true (invariant) when the $i^{th}$ iteration completes. In questions 1 and 2, you just proved that $S_0$ and $S_{i-1} \rightarrow S_i$)

4.  What does the function return in terms of n? [          ]
    The value that power2() returns should be consistent with $S_n$.

*Congratulations! You just finished a proof using loop invariant and induction.*