CS205- Summer 2012
Quiz 5 Name: _____

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible; when you do use your calculator, sketch all relevant graphs and write down all relevant mathematics. You have 15 minutes to take this 15 point quiz.

1. (*10 points*) Let $P(n)$ be the statement that $1^3 + 2^3 + 3^3 + \ldots + n^3 = \frac{n^2(n+1)^2}{4}$.

1. What is the statement P(1) ?

2. Show that P(1) is true, completing your basis step.

3. What is the inductive hypothesis ?

4. What do you need to prove in the inductive step ?

5. Complete the inductive step.

6. Explain in words why these steps show that this formula is true whenever n is a positive integer.

2. (*5 points*) Conjecture a formula for the sum of of first n even integers.

1. $2 + 4 =$ _____
2. $2 + 4 + 6 =$ _____
3. $2 + 4 + 6 + 8 =$ _____
   $\vdots$
4. $2 + 4 + 6 + 8 + \ldots + 2n =$ _____ (Make a guess here based on examples above in terms of n.)

If we would like to prove the above conjecture using mathematical induction then let $P(n)$ denote the statement above and answer the questions below.

1. What is the statement $P(n)$ which needs to be proved ?
2. What is the inductive hypothesis ?
3. What do you need to prove in the inductive step ?