Problem of the Month, January 2008

Please turn all solutions into Dr. Dunn’s office, JB 322. You may slide your solutions under his door as well. Most elegant solution wins a $10 gift certificate to the bookstore! Solutions will be accepted anytime during the month of January, 2008. Good luck!

This problem has two parts:

1. The continued square root $\sqrt{2 + \sqrt{2 + \sqrt{2 + \ldots}}}$ is actually equal to an integer. What is its value?

2. Consider the equation $r = \sqrt{n + \sqrt{n + \sqrt{n + \ldots}}}$. For which integers $n$ is $r$ an integer? On the other hand, which integers may be written as $\sqrt{n + \sqrt{n + \sqrt{n + \ldots}}}$ for some integer $n$?