1. (15 pts) Let \((\cos t, t^2)\) parametrize the motion of an object for \(16 \leq t \leq 52\). Find the exact distance travelled by the object from \(t = 16\) to \(t = 52\).

2. (15 pts) Using the same parametrization from problem 1, approximate the distance travelled by the object from \(t = 16\) to \(t = 52\). I’ll take off points if you don’t “break up” into at least 3 pieces for the approximation.
3. (15 pts) A hot air balloon left the ground rising at 3 feet per second. Sixteen seconds later, Victor threw a ball straight up to his nemesis John in the balloon. At what speed did he throw the ball if it just made it to John?

4. You need not show work on this problem.

1. (5 pts) If I make a triangular display of cans with 1 can in the first row, 2 in the second, 3 in the third, and so on, all the way up to and including row 49, then how many cans are there in the arrangement? Use the fact that
\[ \sum_{i=1}^{n} i = \frac{n(n+1)}{2} \]

2. (5 pts) A graph is drawn on the board that represents the growth rate, in inches per year, of a certain rug rat. The numbers labelled in the regions are areas. If the rug rat ends up at height 65 inches then how tall was the rug rat at the beginning? (Show a little work to be safe.)

3. (5 pts) Does slice, approximate, integrate give exact or approximate answers?