1-2. *Soln.* Observe that

$$\begin{aligned}
\text{pesky}(n) &= \sum_{i=1}^{n}\sum_{j=1}^{i}\sum_{k=j}^{i+j} 1 && (1)\\
&= \sum_{i=1}^{n}\sum_{j=1}^{i}\sum_{k=0}^{i} 1 && (2)\\
&= \sum_{i=1}^{n}\sum_{j=1}^{i}(i+1) && (3)\\
&= \sum_{i=1}^{n}\left(\sum_{j=1}^{i} i + \sum_{j=1}^{i} 1\right) && (4)\\
&= \sum_{i=1}^{n}(i^2+i) && (5)\\
&= \sum_{i=1}^{n} i^2 + \sum_{i=1}^{n} i && (6)\\
&= \sum_{i=1}^{n} i^2 + \frac{n(n+1)}{2} && \text{(Def. of } n\text{th triangular number)} \quad (7)\\
&= \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2} && \text{(Def. of sum of the first } n \text{ square numbers)} \quad (8)\\
&= \frac{n(n+1)(2n+1)+3n(n+1)}{6} && (9)\\
&= \frac{n(n+1)\big((2n+1)+3\big)}{6} && (10)\\
&= \frac{n(n+1)2(n+2)}{6} && (11)\\
&= \frac{n(n+1)(n+2)}{3}. && (12)
\end{aligned}$$

Thus $n(n+1)(n+2)\frac{1}{3} = (n^3+3n^2+2n)\frac{1}{3} \leq 2n^3\frac{1}{3} \implies \text{mystery}(n) = O(n^3)$.