M378K Introduction to Mathematical Statistics
Problem Set #2
Expectation and variance: the discrete case.

Problem 2.1. Source: Sample P exam, Problem #481.
The number of days required for a damage control team to locate and repair a leak in the hull of a ship is modeled by a discrete random variable N. N is uniformly distributed on $\{1, 2, 3, 4, 5\}$.

The cost of locating and repairing a leak is $N^2 + N + 1$.

Calculate the expected cost of locating and repairing a leak in the hull of the ship.

Problem 2.2. Source: Sample P exam, Problem #458.
An investor wants to purchase a total of ten units of two assets, A and B, with annual payoffs **per unit** *purchased of X and Y, respectively. Each asset has the same purchase price per unit. The payoffs are independent random variables with equal expected values and with $\mathrm{Var}(X) = 30$ and $\mathrm{Var}(Y) = 20$.*

Calculate the number of units of asset A the investor should purchase to minimize the variance of the total payoff.