HW Section 7.2 p.505

7.53 Let V = vault, P = parallel bars, B = balance beam, and F = floor exercise. Carly's expected score is $\mu_{V+P+B+F} = \mu_V + \mu_P + \mu_B + \mu_F = 9.314 + 9.553 + 9.461 + 9.543 = 37.871$ points. The variance of her total score is $\sigma^2_{V+P+B+F} = \sigma^2_V + \sigma^2_P + \sigma^2_B + \sigma^2_F = 0.216^2 + 0.122^2 + 0.203^2 + 0.099^2 \doteq 0.1126$, so $\sigma_{V+P+B+F} = \sqrt{0.1126} \doteq 0.3355$ points. The distribution of Carly Patterson's total score T will be N(37.871, 0.3355). The probability that she will beat the score of 38.211 is $P(T > 38.211) = P\left(Z > \frac{38.211 - 37.871}{0.3355}\right) = P(Z > 1.0134) \doteq 0.1554$ (Table A gives 0.1562).

7.55 The missing probability is 0.99058 (so that the sum is 1). The mean earnings is $\mu_X \doteq \$303.35$.

7.56 The mean μ_X of the company's "winnings" (premiums) and their "losses" (insurance claims) is about \$303.35. Even though the company will lose a large amount of money on a small number of policyholders who die, it will gain a small amount from many thousands of 21-year-old men. In the long run, the insurance company can expect to make \$303.35 per insurance policy. The insurance company is relying on the Law of Large Numbers.

7.60 (a) The mean profit is $\mu_X = 1\times0.1 + 1.5\times0.2 + 2\times0.4 + 4\times0.2 + 10\times0.1 = \$3$ million. The variance is $\sigma^2_X = (1-3)^2\times0.1 + (1.5-3)^2\times0.2 + (2-3)^2\times0.4 + (4-3)^2\times0.2 + (10-3)^2\times0.1 = 6.35$, so the standard deviation is $\sigma_X = \sqrt{6.35} \doteq \$2.5199$ million. (b) The mean and standard deviation of Y are $\mu_Y = 0.9\mu_X - 0.2 = 0.9\times\$3 - 0.2 = \$2.5$ million and $\sigma_Y = \sqrt{0.9^2\sigma^2_X} = \sqrt{0.9^2\times6.35} \doteq \$2.2679$ million.