doesn’t spend any time with the student, then \( Z \) will be equal to \( X + Y \). On the other hand, if the professor is interrupted by the student, then the length of time will be equal to \( X + Y + R \). This is because the professor will spend the same amount of total time on the task regardless of whether he is interrupted by the student. Therefore,

\[
\]

Using the results of the earlier calculations,

\[
E[X + Y] = 5, \quad E[X + Y + R] = E[X + Y] + E[R] = 5 + \frac{1}{2} = \frac{11}{2}.
\]

Therefore,

\[
E[Z] = 0.68 \cdot 5 + 0.32 \cdot \frac{11}{2} = 5.16.
\]

Thus the expected time the professor will leave his office is 5.16 hours after 9 a.m.

**Solution to Problem 4.29.** The transform is given by

\[
M(s) = E[e^{sX}] = \frac{1}{2} e^s + \frac{1}{4} e^{2s} + \frac{1}{4} e^{3s}.
\]

We have

\[
E[X] = \left. \frac{d}{ds} M(s) \right|_{s=0} = \frac{1}{2} + \frac{2}{4} + \frac{3}{4} = \frac{7}{4},
\]

\[
E[X^2] = \left. \frac{d^2}{ds^2} M(s) \right|_{s=0} = \frac{1}{2} + \frac{4}{4} + \frac{9}{4} = \frac{15}{4},
\]

\[
E[X^3] = \left. \frac{d^3}{ds^3} M(s) \right|_{s=0} = \frac{1}{2} + \frac{8}{4} + \frac{27}{4} = \frac{37}{4}.
\]

**Solution to Problem 4.30.** The transform associated with \( X \) is

\[
M_x(s) = \frac{\lambda}{\lambda - s}.
\]

By taking derivatives with respect to \( s \), we find that

\[
E[X] = 0, \quad E[X^2] = 1, \quad E[X^3] = 0, \quad E[X^4] = 3.
\]

**Solution to Problem 4.31.** The transform is

\[
M(s) = \frac{\lambda}{\lambda - s}.
\]

Thus,

\[
\frac{d}{ds} M(s) = \frac{\lambda}{(\lambda - s)^2}, \quad \frac{d^2}{ds^2} M(s) = \frac{2\lambda}{(\lambda - s)^3}, \quad \frac{d^3}{ds^3} M(s) = \frac{6\lambda}{(\lambda - s)^4}.
\]