M 362K Synopses for 3/24

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The expected value of $g(x)$ in a contunuous random variable is $E[g(x)] = \int_{-\infty}^{\infty} g(x) \cdot f(x)dx$. Similarly, the variance is also defined as $Var[X] = E[X^2] - E[X]^2$. The variance obeys the linear tansformation rule. Meanwhile, the mode of X is defined as the values such that $f(x)$ is at global maximum, where $f(x)$ is the probability density function. In order to calculate the percentile $100p^{th}$, we only have to let $p = Pr(X \leq x_p)$ then calculate x_p. Therefore $x_{0.5}$ is defined as median. Finally, an alternative to calculate the expected value is $E[X] = A + \int_A^B [1 - F(x)]dx$. Here (A, B) is the interval which the random variable lives on.