**Midterm Examination**

October 18, 2024

1. The random variable X has the following probability mass function: P {X = 1} = 1/2, P{X = 2} = 1/3, P{X = 24} = 1/6. Find E[X].
2. Let X be a Poisson random variables with mean λ.

**a.** Find the probability that X = x

**b.** Find the moment generation function of random variable X.

**c.** Find the expectation of X, E[X].

**d.** Find the second moment of X, E[X2].

**e.** Find the variance of X.

1. Let X be a Normal random variable with zero mean and variance of 1. Let Y = 2X + 1, compute mean and variance of Y.
2. Given FX(x) and FY(y)
3. Let Z = max(X, Y). Determine FZ(z) and fZ(z)
4. Let W = min(X, Y). Determine FW(w) and fW(w)
5. If f(x) = 0 for x < 0, then, for any α > 0, prove P {X ≥ α} ≤ E[X] / α .