MAT1372, Quiz6, Fall2025

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- This quiz consists of 2 question for a total of 10 points.
- You have 15 minutes to complete the quiz.
- Show all work and justify your answers.
- Wishing you success.

1. Consider a random variable X that takes on either the value 1 or 0 with respective probabilities p and $1-p$. That is, $P(X=1)=p$, and $P(X=0)=1-p$. Find $E[X]$.

$E(X)=1\cdot P(X=1)+0\cdot P(X=0)$

$=1\cdot p+0\cdot(1-p)=p.$

2. A building contractor has sent in bids for three jobs. If the contractor obtains these jobs, they will yield respective profits of 20, 25, and 40 (in units of \$1000). On the other hand, for each job the contractor does not win, he will incur a loss (due to time and money already spent in making the bid) of 2 (in units of \$1000). If the probabilities that the contractor will get these jobs are, respectively, 0.3, 0.6, and 0.2, what is the expected total profit? (for example, let the first job be X_1, we have $P(X_1: win)=0.3$ and $P(X_1: loss)$ =1-0.3= 0.7)

Let X_1, X_2, X_3 be the profits of these three jobs, respectively.

$P(X_1=20)=0.3$ ✓ if win, get 20k

$P(X_1=-2)=1-0.3=0.7$ ✓ if lose, loss 2k

$E(X_1)=20\cdot P(X_1=20)+(-2)\cdot P(X_1=-2)$

$=20\cdot 0.3+(-2)\cdot 0.7$

$=6-1.4=4.6$

$P(X_2=25)=0.6$

$P(X_2=-2)=1-0.6=0.4$

$E(X_2)=25\cdot P(X_2=25)+(-2)\cdot P(X_2=-2)$

$=25\cdot 0.6+(-2)\cdot 0.4$

$=15-0.8=14.2$

$P(X_3=40)=0.2$

$P(X_3=-2)=1-0.2=0.8$

$E(X_3)=40\cdot P(X_3=40)+(-2)\cdot P(X_3=-2)$

$=40\cdot 0.2+(-2)\cdot 0.8$

$=8-1.6=6.4$

Let X be the total profit, then $X=X_1+X_2+X_3$. and

$E(X)=E(X_1)+E(X_2)+E(X_3)=4.6+14.2+6.4=25.2$ k