Math 480 Quiz 3 fall 2018 Name____________________

y	-4	0	3
p(y)	1/7	2/7	4/7

1) Let the discrete random variable Y have a probability mass function (pmf) given by the table above.

a) Find E(Y). $= \sum y\,p(y) = -4(\frac{1}{7}) + 0(\frac{2}{7}) + 3(\frac{4}{7}) = \boxed{\frac{8}{7} = 1.1429}$

b) Find E(Y^2). $= \sum y^2 p(y) = 16(\frac{1}{7}) + 0(\frac{2}{7}) + 9(\frac{4}{7}) = \boxed{\frac{52}{7} = 7.4286}$

c) Find the standard deviation of Y. $= \sqrt{EY^2 - (EY)^2} = \sqrt{V(Y)}$

$= \sqrt{\frac{52}{7} - \underbrace{(\frac{8}{7})^2}_{1.3061}} = \sqrt{\frac{300}{49}} = \sqrt{6.1224} = \boxed{2.4743}$

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2) If Y is Poisson with $\lambda = 3$
a) Find $E(Y)$.

$= \lambda = \boxed{3}$

b) Find $P(Y = 2)$. $p(k) = \frac{e^{-\lambda}\lambda^k}{k!}$

so $p(2) = \frac{e^{-3} 3^2}{2!} = \boxed{0.2240}$

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$X \sim bin(n=9, p=\frac{1}{3})$

3) Approximately 1/3 Americans 20 years of age or older are at high risk for coronary disease. Suppose nine Americans 20 years or older are randomly chosen and tested for whether they are at high risk for coronary disease. Let X be the number who were at high risk.

a) Find the mean $E(X)$. $= np = 9\frac{1}{3} = \boxed{3}$

b) Find the variance $V(X)$. $= np(1-p) = 9(\frac{1}{3})\frac{2}{3} = \frac{18}{9} = \boxed{2}$

c) Find the probability that $X = 4$. Simplify.

$p(x) = \binom{n}{x} p^x (1-p)^{n-x}$

$p(4) = \underbrace{\binom{9}{4}}_{\frac{9!}{4!\,5!} = 126} (\frac{1}{3})^4 (\frac{2}{3})^5 = 126 (\frac{1}{3})^4 (\frac{2}{3})^5$

$= 0.2048$

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