Math 404 Quiz 6 Spring 2018 Name_____

YOU ARE BEING GRADED FOR WORK

$\hat{\theta}$

1) Suppose a Poisson (θ) distribution is the fitted distribution where $\overline{X} = 2$. Fill in the following table that would be used for a χ^2 test.

interval	$O_i = n_i$	$\hat{p}_i =$ p_i	$E_i = np_i$	$C_i = \frac{(O_i - E_i)^2}{E_i}$
0	9	0.1353	13.53	1.5167
1	34	0.2707	27.07	1.7741
2	22	0.2707	27.07	0.9496
3	23	0.1804	18.04	1.3637
4+	12	0.1429	14.29	0.3670

$p_i = \frac{e^{-\theta}\theta^i}{i!}$

$\hat{\theta} = 2$

100

$\hat{p}_3 = \frac{2^3 e^{-2}}{6} = \frac{4}{3} e^{-2} = .1804$

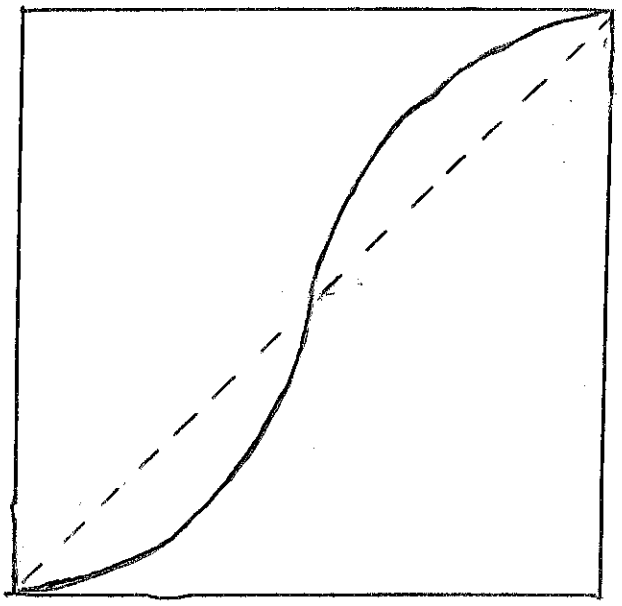
(For a test $r = 1$)

$\hat{p}_{4+} = P(X \geq 4) = 1 - \hat{p}_0 - \hat{p}_1 - \hat{p}_2 - \hat{p}_3$

$= 0.1429$

25

2) For the following $p - p$ plot, are the tails of the fitted distribution light or heavy?



Slope < 1 near $(0,0)$ and $(1,1)$

So light

thin

35

3) Suppose the fitted distribution gave the following table. Fill in the table and do a 4 step χ^2 test.

type	$O_i = n_i$	p_i	$E_i = np_i$	$C_i = \frac{(O_i - E_i)^2}{E_i}$
A	86	0.5	100	1.96
B	45	0.2	40	0.625
C	69	.3	60	1.35
	200	1	200	3.935

r=0 since not told MLE was used

$\alpha = .05$ since α is not given

i) Ho fitted dist is good H1 not Ho

ii) $Q = 3.935$

iii) $df = k - r - 1 = 3 - 0 - 1 = 2$ | .95 | 5.991

$Q < 5.991$ fail to reject Ho

iv) the fitted dist is good (or not enough evidence to say fitted dist is not good)

7.5

4) Decide whether a Poisson, Negative Binomial or Binomial distribution best fits the data given in the table below.

number of accidents	number of policies	$\frac{kn_k}{n_{k-1}}$
0	425	
1	401	$401/425 = .9435$
2	154	$2(154)/401 = .7681$
3	19	$3(19)/154 = .3701$
4	1	$(4(1)/19 = .2105)$ too small
total	1000	

(Poisson want values to not be strictly increasing or strictly decreasing)

← ignore this value of $\frac{kn_k}{n_{k-1}}$ since $n_4 = 1$

decreasing so binomial

or $\bar{x} = \frac{401 + 154(2) + 19(3) + 1(4)}{1000} = \frac{770}{1000} = 0.77 = m$ $\bar{x} > \hat{\sigma}^2$ so bad test for poisson

$t = \frac{1}{n}\sum x_i^2 = \frac{401 + 154(2^2) + 19(3^2) + 1(4^2)}{1000} = \frac{1204}{1000} = 1.204$

$\hat{\sigma}_E^2 = t - m^2 = 1.204 - (.77)^2 = .6111$, $\hat{\sigma}_U^2 = \frac{1000}{999}\hat{\sigma}_E^2 = .6118$