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 57:022 Principles of Design II - Quiz #2  
 Wednesday, February 6, 2002  
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Production of parts by a machine is a Poisson process, at the average rate of 2 parts per hour. Inspection will find that 20% of the processed parts are defective.

Match the name of the distribution to the random variable:

- |  |   |   |
|--|---|---|
| <p>___ 1. the number of parts which are produced during the first eight hours?</p> <p>___ 2. the time between production of parts?</p> <p>___ 3. the number of defective parts which are produced during the first eight hours?</p> <p>___ 4. the time that the second defective part is produced?</p> <p>___ 5. the number of defective parts among the first eight which are produced?</p> | <p><i>Some common probability distributions:</i></p> <p>A. Bernoulli</p> <p>B. Normal</p> <p>C. Lambda</p> <p>D. Binomial</p> <p>E. Chi-square</p> <p>F. Exponential</p> <p>G. Beta</p> <p>H. Geometric</p> | <p>I. Uniform</p> <p>J. Poisson</p> <p>K. Pascal</p> <p>L. Random</p> <p>M. Gumbel</p> <p>N. Weibull</p> <p>O. Erlang</p> <p>P. None of the above</p> |
|--|---|---|

In each case below, use the tables and select the *nearest* numerical value.

- \_\_\_ 6. The probability that the first part is completed during the first half-hour.
- a. 0.1      b. 0.2      c. 0.3  
 d. 0.4      e. 0.5      f. 0.6  
 g. 0.7      h. 0.8      i. 0.9
- \_\_\_ 7. The probability that exactly two of the first eight parts are defective.
- a. 0.1      b. 0.2      c. 0.3  
 d. 0.4      e. 0.5      f. 0.6  
 g. 0.7      h. 0.8      i. 0.9
- \_\_\_ 8. The probability that exactly two parts are completed during the first hour
- a. 0.1      b. 0.2      c. 0.3  
 d. 0.4      e. 0.5      f. 0.6  
 g. 0.7      h. 0.8      i. 0.9
- \_\_\_ 9. The probability that the second part is completed during the first hour.
- a. 0.1      b. 0.2      c. 0.3  
 d. 0.4      e. 0.5      f. 0.6  
 g. 0.7      h. 0.8      i. 0.9

Exponential Dist'n, Lambda = 2/hour		
t	P{T≤t}	P{T>t}
0	0	1
0.25	0.393469	0.606531
0.5	0.632121	0.367879
0.75	0.77687	0.22313
1	0.864665	0.135335
1.25	0.917915	0.082085
1.5	0.950213	0.0497871
1.75	0.969803	0.0301974
2	0.981684	0.0183156

Poisson Distribution, expected value 2			
x	P{X=x}	P{X≤x}	P{X>x}
0	0.135335	0.135335	0.864665
1	0.270671	0.406006	0.593994
2	0.270671	0.676676	0.323324
3	0.180447	0.857123	0.142877
4	0.090223	0.947347	0.052653
5	0.036089	0.983436	0.016563
6	0.012029	0.995466	0.004533
7	0.003437	0.998903	0.001096
8	0.000859	0.999763	0.000237

Binomial Distribution (n= 8, p= 0.2)			
x	P{x}	P{X ≤ x}	P{X > x}
0	0.16777	0.16777	0.83222
1	0.33554	0.50331	0.49668
2	0.29360	0.79691	0.20308
3	0.14680	0.94371	0.05628
4	0.04587	0.98959	0.01040
5	0.00917	0.99876	0.00123
6	0.00114	0.99991	0.00008
7	0.00008	0.99997	0.00003
8	0.00003	1.00000	0.00000