JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE (CREDITS): 18B11MA411 (3) MAX. MARKS: 25

COURSE NAME: BIOSTATISTICS

COURSE INSTRUCTORS: SST MAX. TIME: 1 Hour 30 Minutes

Note: *All questions are compulsory. Marks are indicated against each question in square brackets .Use of scientific calculator is allowed.*

1. Consider the following data on the number of hours that 10 French persons in Kendriya Hindi Sansthan, India, studied for a Hindi test and their scores on the test:

Hours studied (x)	4	9	10	14	4	7	12	22	1	17
Test scores (y)	31	58	65	73	37	44	60	91	21	84

   a) find the equation of the least squares line that approximates the regression of the test scores on the number of hours studied;
   b) predict the average test score of a person who studied 14 hours for the test.

(CO-1)[4M+1M]

2. A mail-order house employs three stock clerks, *U*, *V*, and *W*, who pull items from shelves and assemble them for subsequent verification and packaging. *U* makes a mistake in an order (gets a wrong item or the wrong quantity) one time in a hundred, *V* makes a mistake in an order five times in a hundred, and *W* makes a mistake in an order three times in a hundred. If *U*, *V*, and *W* fill, respectively, 30, 40, and 30 percent of all orders, what are the probabilities that
   a) a mistake will be made in an order;
   b) if a mistake is made in an order, the order was filled by *U*;
   c) if a mistake is made in an order, the order was filled by *V*?

(CO-2)[1M+2M+2M]

3. For what values of k can $f(x) = (1-k)k^x$ serve as the values of the probability distribution of a random variable with the countably infinite range $x = 0,1,2, \ldots$?

(CO-2)[4M]

4. The actual amount of coffee (in grams) in a 230-gram jar filled by a certain machine is a random variable whose probability density is given by

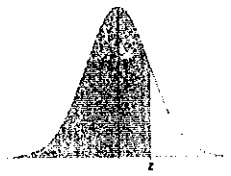
$$f(x) = \begin{cases} 0, & x \le 227.5 \\ \frac{1}{5}, & 227.5 < x < 232.5 \\ 0, & x \ge 232.5 \end{cases}$$

   Find the probabilities that a 230-gram jar filled by this machine will contain
   a) at most 228.65 grams of coffee;
   b) anywhere from 229.34 to 231.66 grams of coffee;
   c) at least 229.85 grams of coffee.

(CO-2)[1M+1M+1M]

5. The number of monthly breakdowns of a super computer is a random variable having a Poisson distribution with $\lambda = 1.8$. Find the probabilities that this computer will function
   a) without a breakdown;
   b) with only one breakdown. **(CO-2)[2M+2M]**
6. Suppose that the amount of cosmic radiation to which a person is exposed when flying by jet across the United States is a random variable having a normal distribution with a mean of 4.35 mrem and a standard deviation of 0.59 mrem. What is the probability that a person will be exposed to more than 5.20 mrem of cosmic radiation on such a flight? (mrem i.e., millirem is the unit used for measuring the radiation dose.) **(CO-2)[4M]**

Standard Normal Cumulative Probability Table



Cumulative probabilities for POSITIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319