QUESTIONS:

1. In regression analysis, the equation that describes how the response variable (y) is related to the explanatory variable (x) is:

   A. the correlation model.
   B. the regression model.
   C. used to compute the correlation coefficient.
   D. none of these alternatives is correct.

2. A negative relationship between two variables means that if the independent variable increases, the dependent variable will

   A. Not change
   B. Increase
   C. Decrease
   D. Can't be predicted

3. The predicted rate of response of the dependent variable to changes in the independent variable is called:

   A. Slope
   B. Intercept
   C. Error
   D. Regression equation

4. Regression analysis was applied to return rates of sparrow-hawk colonies. Regression analysis was used to study the relationship between return rate (x: % of birds that return to the colony in a given year) and immigration rate (y : % of new adults that join the colony per year). The following regression equation was obtained.

   $$y = 31.9 - 0.34x$$

   Based on the above estimated regression equation, if the return rate were to decrease by 10% the rate of immigration to the colony would:

   A. increase by 34%
   B. increase by 3.4%
   C. decrease by 0.34%
   D. decrease by 3.4%

5. Which ***one*** of the following statements about time-series forecasting is true?

   A. Forecasting is based on the future.
   B. The analysis of past demand helps predict future demand.
   C. It makes extensive use of the data collected in the qualitative approach.
   D. Because it accounts for trends, cycles, and seasonal patterns, it is more powerful than causal forecasting.

6. The fundamental difference between cycles and seasonality is the

   A. duration of the repeating patterns
   B. magnitude of the variation
   C. ability to attribute the pattern to a cause
   D. all of the above

7. The rise and fall of a time series over periods longer than one year is called:

   A. Secular trend.
   B. Seasonal variation.
   C. Cyclical variation.
   D. Irregular variation.

8. The general pattern of increase or decrease in economics or social phenomena is shown by:

   A. Seasonal trend.
   B. Cyclical trend.
   C. Secular trend.
   D. Irregular trend.

9. The following table contains the number of complaints received in a department store for the first 6 months of last year.

Month	Complaints			
January	36			
February	45			
March	81			
April	90			
May	108			
June	144			

Using the given data above, formulate the trend equation using the method of least squares

A. $\hat{y} = 31.29 + 21.09x$
B. $\hat{y} = -0.35 + 0.05x$
C. $\hat{y} = 10.2 + 21.09x$
D. None of the above

10. Six friends play regularly in a chess club. The number of games that each person has won is recorded in the table below.

Player	Games won	Games lost
Tom	5	10
Andy	7	3
Daniel	3	9
Rachel	4	16
Maria	6	14
Charles	12	6

If Maria played against Tom, who do you think would be most likely to win?

A. The probability of a win for Maria is 43% and for Tom 50%, therefore Tom would be most likely to win
B. Maria won more games than Tom, therefore Maria would be most likely to win
C. The probability of a win for Maria is 30% and for Tom 29%, therefore Maria would be most likely to win
D. The probability of a win for Maria is 30% and for Tom 33%, therefore Tom would be most likely to win

11. Below is a table showing the country of origin of visitors to some tourist destinations in Gauteng. Complete the table and answer the following questions.

	Tourist destination		
Country of origin	**Gold Reef City**	**Lost City**	**Total**
UK	300	500	
Germany	250		**550**
USA	350	400	**750**
Total	**900**		**2 100**

What is the most popular destination?

A. Gold Reef City
B. United Kingdom
C. Lost City
D. USA

12. With reference to **Question 11**: If a visitor is selected at random, what is the probability the visitor is from the USA or goes to the Lost City?

A. 0.9286
B. 0.7381
C. 0.5476
D. 0.3571

13. With reference to **Question 11**: If a visitor is selected at random, what is the probability that he\she visited Gold Reef City, given that the visitor is from Germany?

A. 0.4545
B. 0.2778
C. 0.1190
D. 0.0510

14. Outside a house there is a keypad that can be used to open the garage door if the correct four digit code (from 0 to 9) is entered. How many codes are possible?

A. 40
B. 210
C. 5 040
D. 151 200

15. A Cape Town courier service promises that 80% of Johannesburg-bound parcel deliveries will reach their destinations within 12 hours. What is the probability that of 7 parcels sent at random times by a particular client in Cape Town:

Only 1 will be delivered late
A. 0.0000002
B. 0.00036
C. 0.2062
D. 0.3670

16. With reference to **Question 15**: Only one will be delivered within 12 hours

    A. 0.00036
    B. 0.2684
    C. 0.0056
    D. 0.0141

17. A telephone help line receives calls that can be described by the Poisson distribution. The average rate at which calls come in is 2 calls per minute. The probability that the help-line will receive exactly five calls in 30 seconds is

    A. 0.0361
    B. 0.9969
    C. 0.0031
    D. 0.00028

18. The normal probability distribution is symmetrical around the

    A. Tails
    B. x-axis
    C. mean
    D. area to the right of the mean

19. The cost of treatment per patient for a certain medical problem was modelled by one insurance company as a normal random variable with a mean of R775 and standard deviation of R150.

    What is the probability that the treatment cost of a patient is less than R1 000?

    A. 0.0668
    B. 0.4332
    C. 0.9332
    D. 0.9525

20. With reference to **Question 19**: What is the probability that the treatment cost of a patient is more than R1 000?

    A. 0.0668
    B. 0.4332
    C. 0.5668
    D. 0.9332

21. With reference to **Question 19**: The 30% of the patients, whose treatment costs are the lowest, pay less than how much?

    A. R649
    B. R697
    C. R853
    D. R901

22. With reference to **Question 19**: What is the probability that the treatment cost of a patient is between R600 and R700?

    A. 0.1875
    B. 0.2486
    C. 0.3125
    D. 0.5705

23. An estimate of a population parameter that provides an interval of values believed to contain the value of the parameter is known as the

    A. Confidence level
    B. Interval estimate
    C. Parameter value
    D. Population estimate

24. Which of the following statements completes the following statement correctly? The larger the level of confidence used in constructing a confidence interval estimate of the population mean:

    A. The smaller the probability that the confidence interval will contain the population mean
    B. The narrower the confidence interval
    C. The wider the confidence interval
    D. The more the width of the confidence interval remains the same

25. A random sample of size 15 taken from a normally distributed population revealed a sample mean of 75 and a sample variance of 25. The margin of error of a 95% confidence interval for the population would equal:

    A. 2.77
    B. 1.29
    C. 1.96
    D. 13.84

26. From a random sample of 500 registered voters in South Africa, 400 indicated that they would vote in favor of a proposed policy in an upcoming election. The 98% confidence interval estimate for the population proportion in favor of this policy is:

    A. 75.83% < π < 84.17%
    B. 76.33% < π < 83.67%
    C. 76.49% < π < 83.51%
    D. 78.21% < π < 81.79%

27. An advertising agency would like to create an advertisement for a fast food restaurant claiming that the average waiting time from ordering to receiving your order at the restaurant is less than 5 minutes. The agency measured the time from ordering to delivery for 25 customers and found that the average time was 4.7 minutes with a standard deviation of 0.6 minutes. At the 5% level of significance, the confidence interval estimate for the average time between ordering and receiving the order is

    A. 4.7 ± 0.2053
    B. 4.7 ± 0.2352
    C. 4.7 ± 0.2477
    D. 4.7 ± 0.2572

28. The manufacturer of a new chewing gum claims that 80% of dentists surveyed prefer their type of gum and recommend it for their patients who chew gum. An independent consumer research firm decides to test their claim since the distribution company believes the number of patients who prefer the dentist's type of gum is higher than claimed. The findings in a sample of dentists indicate that 210 of the 250 respondents do actually prefer their gum.

    If the null and the alternative hypothesis are: H_0: $\pi = 0.8$; H_a : $\pi > 0.8$, the rejection region for the H_0 at a 2% level of significance will be

    A. If *z*-test statistic is more than 0.48
    B. If *z*-test statistic is more than 2.05
    C. If *z*-test statistic is more than 1.96 or less than -1.96
    D. If the *z*-test statistic is more than 2.33 or less than -2.33

29. With reference to **Question 28**: The *z*-test statistic value will be

    A. -1.73
    B. -1.58
    C. 1.58
    D. 7.90

30. With reference to **Question 28**: If the test statistic falls in the acceptance region, the decision will be

    A. Do not reject H_0. There is evidence to suggest that a higher number of patients prefer the dentist's type of gum.
    B. Do not reject H_0. There is no evidence to suggest that a higher number of patients prefer the dentist's type of gum.
    C. Reject H_0. There is no evidence to suggest that a higher number of patients prefer the dentist's type of gum
    D. Reject H_0. There is evidence to suggest that a higher number of patients prefer the dentist's type of gum.

FORMULAE SHEET:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - \left(\sum x\right)^2\right]\left[n\sum y^2 - \left(\sum y\right)^2\right]}}$$

$$r' = 1 - \frac{6(d^2)}{n(n^2-1)}$$

$$\hat{y} = a + bX$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$

$$a = \frac{\sum y}{n} - b\frac{\sum x}{n}$$

$$P(A \text{ or } B) = P(A) + P(B)$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

$$P(A \text{ and } B) = P(A) \cdot P(B \backslash A)$$

$$n \times m \times \ldots\ldots..$$

$${}_nC_x = \frac{n!}{x!(n-x)!}$$

$${}_nP_x = \frac{n!}{(n-x)!}$$

$$P(x) = \frac{n!}{x!(n-x)!} \cdot \pi^x \cdot (1-\pi)^{n-x}$$

$$Z = \frac{x-\mu}{\sigma}$$

$$\pi = p \pm z\sqrt{\frac{p(1-p)}{n}}$$

$$\mu = \bar{x} \pm z \cdot \frac{\sigma}{\sqrt{n}}$$

$$\mu = \bar{x} \pm z\frac{s}{\sqrt{n}}$$

$$\mu = \bar{x} \pm t \cdot \frac{s}{\sqrt{n}}$$

$$z = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$$\frac{p-\pi}{\sqrt{\frac{\pi(1-\pi)}{n}}}$$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$$\sum \frac{(f_o - f_e)^2}{f_e}$$

$$P(x) = \frac{\lambda^x \cdot e^{-\lambda}}{x!}$$

$$n = \frac{z^2 \times \pi(1-\pi)}{E^2}$$

$$n = \left(\frac{Z \times \sigma}{E}\right)^2$$

TABLE OF THE STANDARD NORMAL (z) DISTRIBUTION

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993

THE CHI-SQUARE DISTRIBUTION TABLE

df\area	.100	.050	.025	.010	.005
1	2.70554	3.84146	5.02389	6.63490	7.87944
2	4.60517	5.99146	7.37776	9.21034	10.59663
3	6.25139	7.81473	9.34840	11.34487	12.83816
4	7.77944	9.48773	11.14329	13.27670	14.86026
5	9.23636	11.07050	12.83250	15.08627	16.74960
6	10.64464	12.59159	14.44938	16.81189	18.54758
7	12.01704	14.06714	16.01276	18.47531	20.27774
8	13.36157	15.50731	17.53455	20.09024	21.95495
9	14.68366	16.91898	19.02277	21.66599	23.58935
10	15.98718	18.30704	20.48318	23.20925	25.18818
11	17.27501	19.67514	21.92005	24.72497	26.75685
12	18.54935	21.02607	23.33666	26.21697	28.29952
13	19.81193	22.36203	24.73560	27.68825	29.81947
14	21.06414	23.68479	26.11895	29.14124	31.31935
15	22.30713	24.99579	27.48839	30.57791	32.80132
16	23.54183	26.29623	28.84535	31.99993	34.26719
17	24.76904	27.58711	30.19101	33.40866	35.71847
18	25.98942	28.86930	31.52638	34.80531	37.15645
19	27.20357	30.14353	32.85233	36.19087	38.58226
20	28.41198	31.41043	34.16961	37.56623	39.99685
21	29.61509	32.67057	35.47888	38.93217	41.40106
22	30.81328	33.92444	36.78071	40.28936	42.79565
23	32.00690	35.17246	38.07563	41.63840	44.18128
24	33.19624	36.41503	39.36408	42.97982	45.55851
25	34.38159	37.65248	40.64647	44.31410	46.92789
26	35.56317	38.88514	41.92317	45.64168	48.28988
27	36.74122	40.11327	43.19451	46.96294	49.64492
28	37.91592	41.33714	44.46079	48.27824	50.99338
29	39.08747	42.55697	45.72229	49.58788	52.33562

df	CRITICAL VALUES OF STUDENTS T DISTRIBUTION TABLE					
	1-tailed					
	.10	.05	.025	.01	.005	.0005
	2-tailed test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.683	2.353	3.182	4.5415	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	4.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646