

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please explain following terms

- (a). Hydrological year. (5)
- (b). Designed storm. (5)
- (c). Rational Method. (5)
- (d). Recurrence interval. (5)

2. What is current observation summary of climate change impacts on Taiwan? The "stationarity analysis" could be used for testing climate change impacts on streamflow data. Please explain what "stationarity analysis" is and how the analysis result will show if climate change is true. (20)

3. Please explain how to estimate the 50-year event from 40 years hourly precipitation data. (15)

4. The 50-minute unit hydrograph tabulated below is for a watershed.

Time (min)	0	25	50	75	100	125	150	175	200
UH (cms)	0	45	120	195	210	135	67.5	22.5	0

- (a). What is the watershed area? (6)
- (b). What is the direct runoff hydrograph (DRH) that would be observed from the following effective rainfall data? (24)

Time (min)	0~75	75~100
Effective rainfall (cm)	0.5	1

5. Assume the annual maximum streamflow of a station is log-normal distribution. The median of the streamflow data series is 1,000 cms. The standard deviation of the log streamflow data is 1.2. If the levee near this gauge station is designed for 10,000 cms. Please calculate the probability of getting flood twice in this area in 5 years? (15)

Entry is area A under the standard normal curve from $-\infty$ to $z(A)$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319