Session 1: Practical Exercise

The purpose of this exercise is to provide an illustration of the implications of sampling method.

We have a population of 50 stones. Each of these is numbered (1 to 50) and has been weighed (in grams). Your task is to use a sample of stones to provide an estimate of the population mean weight. You will do this in three ways:

1. Use the (pseudo) random numbers in the table overleaf to select a **random** sample of 10 stones. If you are not sure how to use the random numbers for this, ask for help. You don't need to touch or even to look at the stones for this: you merely record the ten numbers corresponding to the stones in your sample.

2. Your second method is an attempt to choose a '**typical**' sample with similar characteristics to a random sample (but without using random numbers). Go to the actual stones and, **without touching them**, choose a sample of 10 that you think are typical of the population as a whole. Your aim is to provide an unbiased estimate of the mean with similar variability to that in a random sample. Again, just record the ten numbers corresponding to the stones in your sample.

3. Your third method is an attempt to do better than random sampling. Again **without touching the stones** choose a sample of 10 that you think are as close as possible to the average weight. Your aim is to provide an unbiased estimate of the mean, that has less variability than that produced by the random sample. Record the ten numbers corresponding to the stones in your sample.

When you have determined your three samples, come and obtain a sheet containing the weights of the stones. Record the weights of the stones you have selected, *and return the sheet*. Use the individual weights to calculate the **sample mean, standard deviation** and hence the estimated **standard error** for each of your three samples. Record these in the table below. When you are done, give these quantities to the lecturer.

Your name:_____

Sample type	Sample mean	Sample standard deviation	Estimated standard error of sample mean
1. Random			
2. 'Typical'			
3. 'Optimal'			

Pseudo-random Numbers

05	54	89	24	18	21	07	37	96	62	04	12	97	36	34	02	63
81	14	50	40	82	49	01	37	43	93	93	01	02	02	60	22	15
14	35	93	19	37	74	91	95	87	16	12	92	91	42	76	09	17
13	06	23	89	38	01	02	26	09	91	50	38	37	13	53	10	63
07	05	15	39	94	13	68	31	37	47	91	56	65	98	91	53	03
39	84	79	84	41	00	96	08	12	34	55	67	40	64	38	52	28
52	68	93	45	42	42	05	99	22	51	84	36	35	37	64	95	40
79	35	87	38	74	50	94	77	46	96	23	88	30	28	51	26	15
99	33	05	71	06	87	80	04	94	46	27	03	66	88	03	67	06
65	99	12	83	67	57	88	22	37	16	98	56	82	21	74	08	79
79	19	53	13	04	19	70	86	44	30	89	35	70	83	54	76	32
11	84	74	05	20	56	43	05	19	67	72	86	46	17	37	72	94
48	07	76	98	68	55	19	47	51	72	28	24	55	58	63	96	41
07	62	92	91	76	56	82	43	76	61	78	72	78	96	56	86	23
36	41	65	92	20	53	76	44	53	00	64	36	52	50	20	63	66
34	67	11	57	45	37	66	81	82	21	08	44	27	67	67	05	83
93	79	90	70	61	52	55	28	53	08	17	83	86	10	70	28	52
16	16	03	22	88	70	74	28	26	84	88	06	12	22	96	92	43
54	70	01	47	01	65	12	02	70	24	24	44	92	15	13	20	87
26	47	15	18	09	75	72	63	96	95	58	39	82	25	58	75	09
47	57	00	88	50	42	96	41	05	41	88	31	31	25	84	69	68
98	47	99	60	24	66	55	40	79	81	39	71	25	97	35	63	56
54	85	10	92	63	14	67	64	52	49	84	15	38	86	41	51	47
56	30	77	41	18	79	74	66	51	03	30	33	33	92	92	98	55
70	17	32	82	29	77	11	06	44	43	67	08	14	95	83	93	67
66	79	06	53	02	09	60	46	46	40	83	06	01	31	94	09	60
07	62	02	15	39	96	14	43	84	29	35	22	99	82	96	53	74
65	27	24	54	68	13	42	57	25	01	92	50	85	81	54	42	54
78	57	91	44	61	16	96	06	99	70	52	43	36	22	10	79	26
80	02	75	30	48	93	33	07	10	39	18	34	12	22	77	13	38
81	60	07	73	42	61	16	61	32	95	28	14	60	69	25	97	09
68	75	03	79	96	15	72	32	82	88	03	93	46	79	84	98	56
28	19	72	98	03	15	20	91	42	14	13	23	70	36	40	30	73
24	00	24	08	49	41	04	52	69	01	81	77	17	45	25	06	79
42	99	08	97	15	25	99	96	99	47	41	91	20	60	49	44	26
51	50	93	43	97	74	07	73	71	84	01	32	14	13	75	58	78
57	04	41	70	16	37	52	87	82	86	96	46	83	78	54	44	04
52	18	80	40	49	24	28	10	29	91	97	78	07	90	15	88	13
64	11	29	68	64	74	42	55	41	01	10	01	52	65	85	04	47
49	67	33	07	74	95	12	91	86	51	00	59	52	66	65	43	69
70	03	15	54	18	49	76	09	91	69	75	14	11	67	52	43	06
38	83	07	96	90	85	86	75	86	98	56	82	39	49	27	20	99
47	30	10	32	17	46	42	04	71	98	53	99	66	55	28	82	29
88	71	55	24	02	12	63	70	74	71	79	88	45	42	87	89	17
85	56	80	59	10	02	13	36	72	71	60	29	24	43	13	16	80