L2-MATHMF





# Te Pāngarau me te Tauanga, Kaupae 2, 2019

9.30 i te ata Rāpare 21 Whiringa-ā-rangi 2019

PUKAPUKA TIKANGA TĀTAI mō 91261M, 91262M, 91267M

Tirohia tēnei pukapuka hei whakatutuki i ngā tūmahi o ō Pukapuka Tūmahi, Tuhinga hoki.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2 – 3 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

KA TAEA TĒNEI PUKA TE PUPURI HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

#### Whārite pūrua

Mēnā 
$$ax^2 + bx + c = 0$$
  
kāti  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
ā  $\Delta = b^2 - 4ac$ 

### Taupū kōaro

Mēnā 
$$y = b^x$$
 kāti  $x = \log_b y$   
 $\log_b (x^n) = n \log_b x$   
Mēnā  $y = e^x$  kāti  $x = \log_e y (= \ln y)$ 

#### Tuanaki

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(x^n\right) = nx^{n-1}$$

Mēnā 
$$f'(x) = x^n$$
, kāti  $f(x) = \frac{x^{n+1}}{n+1} + c$ 

2



Te Tuaritanga Hangarite Aro Whānui

$$\left(z = \frac{x - \mu}{\sigma}\right)$$

Ko ia tau e whakaatu ana i te tūponotanga ka noho mai te taurangi matap $\bar{o}$ kere hangarite aro wh $\bar{a}$ nui o te Z ki waenganui i te 0 me te z.

		<u> </u>															_	_	
Z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	0000	0040	0080	.0120	0160	0199	0239	0279	0319	0359	4	8	12	16	20	24	28	32	36
0.0	1			.0517							4		12		20			32	
0.1	1			.0910							4		12		19		1	31	
0.2	1			.1293							4		11		19		l	30	
0.3				.1664							4	-	11		18			29	
0.4	.1334	.1391	.1026	.1004	.1700	.1/30	.1//2	.1000	.1044	.10/9	+	/	11	14	10	22	23	29	32
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224	3	7	10	14	17	21	24	27	31
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549	3	6	10	13	16	19	23	26	29
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852	3	6	9	12	15	18	21	24	27
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133	3	6	8	11	14	17	19	22	25
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389	3	5	8	10	13	15	18	20	23
1.0	3413	3438	3461	.3485	3508	3531	3554	3577	3599	3621	2	5	7	9	12	14	16	18	2.1
1.1				.3708							2	4	6		10		1	16	
1.2	1			.3907							2	4	5	7	9	11	13	15	16
1.3				.4082							2	3	5	6		10	-	13	
1.4				.4236							1	3	4	6	7	8		11	
1.5											,	2	4	_					
1.5	1			.4370							1	2	4	5	6	7	l	10	
1.6	1			.4484							1	2	3	4	5	6	7	8	9
1.7	1			.4582							1	2	3	3	4	5	6	7	8
1.8	1			.4664							1	1	2	3	4	4	5	6	6
1.9	.4/13	.4/19	.4/26	.4732	.4/38	.4/44	.4/50	.4/56	.4/61	.4/6/	1	1	2	2	3	4	4	5	5
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817	0	1	1	2	2	3	3	4	4
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857	0	1	1	2	2	2	3	3	4
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890	0	1	1	1	2	2	2	3	3
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916	0	0	1	1	1	2	2	2	2
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936	0	0	1	1	1	1	1	2	2
2.5	4938	4940	4941	.4943	4945	4946	4948	4949	4951	4952	0	0	0	1	1	1	1	1	1
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964	0	0	0	0	1	1	1	1	1
2.7	4965	4966	4967	.4968	4969	4970	4971	4972	4973	4974	0	0	0	0	0	1	1	1	1
2.8	4974	4975	4976	.4977	4977	4978	4979	4979	4980	4981	0	0	0	0	0	0	0	0	1
2.9				.4983							0	0	0	0	0	0	0	0	1
3.0	1987	1087	1087	.4988	1088	1080	1080	1080	1990	1990	0	0	0	0	0	0	0	0	0
3.1				.4991							0	0	0	0	0	0	0	0	0
3.2				.4994							0	0	0	0	0	0	0	0	0
3.3				.4994								0	0	0	0	0	0	0	0
3.4				.4997							0	0	0	0	0	0	0	0	0
												-							
3.5				.4998							0	0	0	0	0	0	0	0	0
3.6				.4999							0	0	0	0	0	0	0	0	0
3.7				.4999							0	0	0	0	0	0	0	0	0
3.8				.4999							0	0	0	0	0	0	0	0	0
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	0	0	0	0	0	0	0	0	0

### **Quadratic Equations**

If 
$$ax^2 + bx + c = 0$$
  
then  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
and  $\Delta = b^2 - 4ac$ 

#### Logarithms

If 
$$y = b^x$$
 then  $x = \log_b y$   

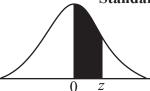
$$\log_b (x^n) = n \log_b x$$
If  $y = e^x$  then  $x = \log_e y$  (= ln y)

#### **Calculus**

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(x^n\right) = nx^{n-1}$$

If 
$$f'(x) = x^n$$
, then  $f(x) = \frac{x^{n+1}}{n+1} + c$ 

**Standard Normal Distribution** 



3

$$\left(z = \frac{x - \mu}{\sigma}\right)$$

Each entry gives the probability that the standardised normal random variable Z lies between 0 and z.

Differences

												Differences								
z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	
0.0	0000	0040	0080	0120	0160	0199	0239	0279	0319	.0359	4	8	12	16	20	24	28	32	36	
0.0										.0754	!		12		20			32		
0.1			.0871								4	-	12		19			31		
0.2										.1517	ı		11		19			30		
	1									.1879	ı		11		18			29		
0.4	.1334	.1391	.1026	.1004	.1700	.1/30	.1//2	.1000	.1044	.10/9		/	11	14	10	22	23	27	32	
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224	3	7	10	14	17	21	24	27	31	
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549	3	6	10	13	16	19	23	26	29	
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852	3	6	9	12	15	18	21	24	27	
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133	3	6	8	11	14	17	19	22	25	
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389	3	5	8	10	13	15	18	20	23	
1.0	3/13	3/138	.3461	3/185	3508	3531	3554	3577	3500	3621	2	5	7	Q	12	14	16	18	21	
1.1			.3686								2	4	6		10		1	16		
1.2	1		.3888								2	4	5	7		11		15		
1.3	1									.4177	l	3	5	6		10		13		
1.3			.4222								1	3	4	6	7	8		11		
1.4	.4192	.4207	.4222	.4230	.4231	.4203	.4213	.4232	.4300	.4319	1	)	7	0	,	o	10	11	13	
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441	1	2	4	5	6	7	8	10	11	
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545	1	2	3	4	5	6	7	8	9	
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633	1	2	3	3	4	5	6	7	8	
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706	1	1	2	3	4	4	5	6	6	
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767	1	1	2	2	3	4	4	5	5	
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817	0	1	1	2	2	3	3	4	4	
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857	0	1	1	2	2	2	3	3	4	
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890	0	1	1	1	2	2	2	3	3	
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916	0	0	1	1	1	2	2	2	2	
2.4			.4922								0	0	1	1	1	1	1	2	2	
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952	0	0	0	1	1	1	1	1	1	
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964	0	0	0	0	1	1	1	1	1	
2.7	1		.4967								0	0	0	0	0	1	1	1	1	
2.8	4974	4975	.4976	4977	4977	4978	4979	4979	4980	4981	0	0	0	0	0	0	0	0	1	
2.9			.4982								0	0	0	0	0	0	0	0	1	
3.0	4987	4987	.4987	4988	4988	4989	4989	4989	4990	4990	0	0	0	0	0	0	0	0	0	
3.1			.4991								0	0	0	0	0	0	0	0	0	
3.2			.4994								0	0	0	0	0	0	0	0	0	
3.3			.4995									0	0	0	0	0	0	0	0	
3.4			.4997								0	0	0	0	0	0	0	0	0	
3.5	4998	4998	.4998	4998	4998	4998	4998	4998	4998	4998	0	0	0	0	0	0	0	0	0	
3.6			.4999								0	0	0	0	0	0	0	0	0	
3.7			.4999									0	0	0	0	0	0	0	0	
3.8			.4999									0	0	0	0	0	0	0	0	
			.5000								0	0	0	0	0	0	0	0	0	
ر.ر	1.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	ı	U	v	U	U	U	1	U	U	

#### L2-MATHMF

## English translation of the wording on the front cover

# **Level 2 Mathematics and Statistics, 2019**

9.30 a.m. Thursday 21 November 2019

FORMULAE BOOKLET for 91261, 91262, 91267

Refer to this booklet to answer the questions in your Question and Answer Booklets.

Check that this booklet has pages 2-3 in the correct order and that neither of these pages is blank.

YOU MAY KEEP THIS SHEET AT THE END OF THE EXAMINATION.