Practical 6

Exercise P1
Open your textbook on p.296. The Excel functions **NORM.S.DIST** and **NORM.S.INV** for computing cumulative probabilities and z values for the **standard normal distribution** are explained.

Using the NORM.S.DIST function to calculate the following probabilities:
a. $P(z \leq 1)$
b. $P(-0.5 \leq z \leq 1.25)$
c. $P(-1.00 \leq z \leq 1.00)$
d. $P(z \geq 1.58)$

Using the NORM.S.INV function to find the z value corresponding to each cumulative probability:
a. z value with 0.1 in upper tail
b. z value with 0.025 in upper tail
c. z value with 0.025 in lower tail

Compare your answers with Figure 6.8 on p.296 of the textbook.

Exercise P2
On p.298 of the textbook, the Excel functions, **NORM.DIST** and **NORM.INV** for computing cumulative probabilities and x values for **any normal distribution** are explained.

Using the NORM.DIST function to calculate the following probabilities:
a. $P(x \leq 20000)$
b. $P(20000 \leq x \leq 40000)$
c. $P(x \geq 40000)$

Using the NORM.INV function to find x values given the cumulative probability:
a. x value with 0.1 in lower tail
b. x value with 0.025 in upper tail

Compare your answers with Figure 6.9 on p.297 of the textbook.

Exercise P3
In the textbook on p.299 no.12, compute the probabilities by making use of Excel 2010.

Figure 8.1: Formula Worksheet

	A	B	C
1	a	P(0 < z < 0.83)	=NORM.S.DIST(0.83,TRUE)-NORM.S.DIST(0,TRUE)
2	b	P(-1.57 < z < 0)	=NORM.S.DIST(0,TRUE)-NORM.S.DIST(-1.57,TRUE)
3	c	P(z > 0.44)	=1-NORM.S.DIST(0.44,TRUE)
4	d	P(z > -0.23)	=1-NORM.S.DIST(-0.23,TRUE)
5	e	P(z < 1.20)	=NORM.S.DIST(1.2,TRUE)
6	f	P(z < -0.71)	=NORM.S.DIST(-0.71,TRUE)

Figure 8.2: Value Worksheet

	A	B	C
1	a	P(0 < z < 0.83)	0.2967
2	b	P(-1.57 < z < 0)	0.4418
3	c	P(z > 0.44)	0.3300
4	d	P(z > -0.23)	0.5910
5	e	P(z < 1.20)	0.8849
6	f	P(z < -0.71)	0.2389

Exercise P4

In the textbook on p.299 no.15, find the z values by making use of Excel 2010.

Figure 8.3: Formula Worksheet

	A	B	C
1	a	The area to the left of z is 0.2119	=NORM.S.INV(0.2119)
2	b	The area between -z and z is 0.9030	=NORM.S.INV(0.9515)
3	c	The area between -z and z is 0.2052	=NORM.S.INV(0.6026)
4	d	The area to the left of z is 0.9948	=NORM.S.INV(0.9948)
5	e	The area to the right of z is 0.6915	=NORM.S.INV(0.3085)

Figure 8.4: Value Worksheet

	A	B	C
1	a	The area to the left of z is 0.2119	-0.7998
2	b	The area between -z and z is 0.9030	1.6596
3	c	The area between -z and z is 0.2052	0.2601
4	d	The area to the left of z is 0.9948	2.5622
5	e	The area to the right of z is 0.6915	-0.5001

Exercise P5

The average ticket price for a major league baseball game was $11.98 in 1998 (USA Today, November 11, 1998). Adding the cost of food, parking and souvenirs, the average cost for a family of four to attend a game was approximately $110. Assume a normal distribution applies and that the standard deviation is $20.

Answer the following questions making use of Excel 2010:

a. What is the probability a family will spend more than $100?
b. What is the probability a family will spend $90 or less?
c. What is the probability a family will spend between $80 and $130?
d. What is the probability that a family will spend between $60 and $95?
e. What is the probability that a family will spend more than $135?
f. The cost for a family is extremely high if it is in the upper 5% of the money bracket. How much must a family spend, for the cost to be classified as extremely high?

Figure 8.5: Formula Worksheet

	A	B	C
1	a	P(x > 100)	=1-NORM.DIST(100,110,20,TRUE)
2	b	P(x < 90)	=NORM.DIST(90,110,20,TRUE)
3	c	P(80 < x < 130)	=NORM.DIST(130,110,20,TRUE)-NORM.DIST(80,110,20,TRUE)
4	d	P(60 < x < 95)	=NORM.DIST(95,110,20,TRUE)-NORM.DIST(60,110,20,TRUE)
5	e	P(x > 135)	=1-NORM.DIST(135,110,20,TRUE)
6	f	x if the area to the right is 0.05	=NORM.INV(0.95,110,20)

Figure 8.6: Value Worksheet

	A	B	C
1	a	P(x > 100)	0.6915
2	b	P(x < 90)	0.1587
3	c	P(80 < x < 130)	0.7745
4	d	P(60 < x < 95)	0.2204
5	e	P(x > 135)	0.1056
6	f	x if the area to the right is 0.05	142.8971

f. A family must spend at least $142.90 to be classified as extremely high.