HKExcel Education IB

IB Math Capture-7 Program

Calculator note

Prepared by Edward

Objective: Master Casio, Texas , T1 inspire calculator

HKEXCEL
Your Partner To Academic Excellence

10. The mass m kg of a radio-active substance at time t hours is given by

$$m = 4e^{-0.2t}.$$

(b) The mass is reduced to 1.5 kg. How long does this take?

1. $\binom{10}{2}$

2. $\binom{8}{3}$

13. Let $f(x) = \ln(x+2)$, $x > -2$ and $g(x) = e^{(x-4)}$, $x > 0$.

(a) Write down the x-intercept of the graph of f.

(b) (i) Write down $f(-1.999)$.

(ii) Find the range of f.

(c) Find the coordinates of the point of intersection of the graphs of f and g.

HKExcel Education Centre
Math HL Capture-7 Program

1. Normal distribution

A. Probability
B. X value finding
C. Z value finding

1A. Probability

The weights of students in HKEcel are normally distributed with a mean of 64.6 KG. It is known that the Standard deviation is 1.44 kg.

a) Find the probability that a student weighs more than 70 kg.

Casio:
Menu-> stat -> Dist- > Norm -> NCD

Type in : Lower: 70, Upper: 10^99 , U: 64.6 , σ : 1.44

Texas T1-84
2nd -> Vars -> normalcdf
Type in : Lower: 70, Upper: 10^99 , U: 64.6 , σ : 1.44

T1 inspire:
Menu-> probability -> distribution-> normal cdf
Type in : Lower: 70, Upper: 10^99 , U: 64.6 , σ : 1.44

Email: ib.team@hkexcel.com

1B.Z value finding

A random variable X is distributed normally with a mean of 30. It is known that $P(X \leq 40)$ is 0.7.

a) Find the standardized value, z, of 40.

Casio:
Menu-> stat -> Dist- > Norm -> InvN

Type in : Data: Variable , Tail: left, Area: 0.7, σ : 1, U: 0

Texas T1-84
2nd -> Vars -> invNorm
Type in : Area: 0.7, , σ : 1, U: 0

T1 inspire:
Menu-> probability -> distribution-> Inverse normal
Type in : Area: 0.7, , σ : 1, U: 0

Email: ib.team@hkexcel.com

1C. X value finding question

4. *[Maximum mark: 6]*

The heights of a group of seven-year-old children are normally distributed with mean 117 cm and standard deviation 5 cm. A child is chosen at random from the group.

(b) The probability that this child is shorter than k cm is 0.65. Find the value of k.

Casio:
Menu-> stat -> Dist- > Norm -> InvN

Type in : Data: Variable , Tail: left, Area: 0.65, σ : 5, U: 117

Texas T1-84
2^{nd} -> Vars -> invNorm
Type in : Area: 0.65, σ : 5, U: 117

T1 inspire:
Menu-> probability -> distribution-> Inverse normal
Type in : Area: 0.65, σ : 5, U: 117

Email: ib.team@hkexcel.com

2. Binomial distribution

A. Exactly P(X=3)
B. Cumulative P(X<3)

2A. Exactly

Example 2: If you throw a coin 100 times, what is the probability of getting **exactly** 10 tails?

Casio:
Menu-> stat -> Dist- > Binm -> BPD

Type in : Data: Variable , X: 10, Numtrial: 100, P: 0.5 -> Execute

Texas T1-84
2nd -> Vars -> binompdf
Type in : trials: 100, p: 0.5 , X value: 10

T1 inspire:
Menu-> probability -> distribution-> binomial pdf
Type in : trials: 100, p: 0.5 , X value: 10

Email: ib.team@hkexcel.com

2B. Cumulative

If you throw a coin 10 times, what is the probability of getting

a) **at least** 8 heads?

$$1 - P(X \leq 7)$$

Casio:
Menu-> stat -> Dist- > Binm -> BCD

Type in : Data: Variable , X:7 , Numtrial: 10, P: 0.5 -> Execute

Texas T1-84
2nd -> Vars -> binomcdf
Type in : trials: 10, p: 0.5 , X value: 7

T1 inspire:
Menu-> probability -> distribution-> binomial cdf
Type in : trials: 10, p: 0.5 , lower: 8 upper : 10

Email: ib.team@hkexcel.com

Sample 1

The number of car accident that occurs I a given period of time has Poisson distribution with a mean of 0.3 accidents per day.

a) Find the probability that two accidents occur on a random day

3. Stat calculation

- **Mean , standard deviation**

X	Freq
12	21
14	12
20	10

Casio:
Menu-> stat -> List 1 & List 2 type data -> Cal *-> 1VAR
(Cal -> Set -> 1 Var Xlist list 1 , 1 Var Freq : List 2)

Texas T1-84
Stat-> Edit -> L1 & L2 type in -> Stat -> Cal -> 1 Var -> List : L1, Freqlist: L2-> Calculate

T1 inspire:
Home screen -> New document -> add list and spreadsheet ->A: type in name of column , B: freq -> type in data -> menu -> statistics -> stat calculation -> 1 var stat

Email: ib.team@hkexcel.com

4. Regression line

- Corelation , equation of reg line Y =MX+C

Find the correlation coefficient r.

x	1	2	3	4	5	6	7
y	5	8	10	13	16	18	20

Casio: fx 9830
Menu→ Stat → Type in data → Cal → REG→X→ ax+b→ refer to "r"

Texas T184:
Stat→ Edit→ Type in data → Stat → Test→ LineRegTTest→ refer to "r"

Tinspire:
Home screen-> new document-> spreadsheet -> A : type in X , B: Y -> enter data -> menu -> stat-> stat cal-> linear regression MX+C

Email: ib.team@hkexcel.com

5. Chi square test

-Chi square test value
-Expected value table

	Regular exercise	*No regular exercise*
Male	112	104
Female	96	88

Casio:
Chi square test value:
Menu-> test -> Chi -> 2 way -> observed A -> F2-> Mat A 2x2 -> type in data-> exit -> exit -> execute

Expected value: (after calculate chi square value)
home screen-> stat -> test -> chi -> 2 way -> expected math B (don't click enter) -> F2 -> Mat B -> enter

Texas T1-84
2^{nd} -> matrix -> edit -> [A] 2x2 -> type in data -> stat -> test -> X^2 test -> calculate

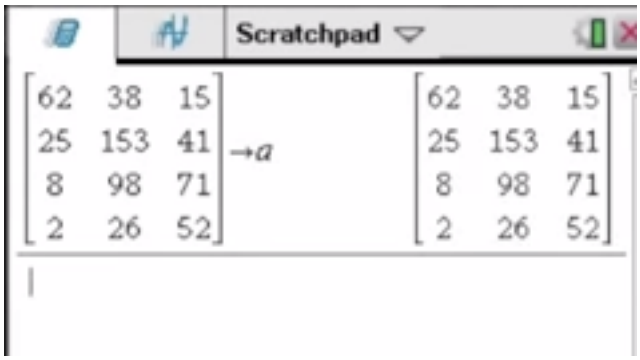
Expected value: (after calculate chi square value)
2^{nd}-> matrix -> [B]-> enter

Email: ib.team@hkexcel.com

T1 inspire:

Chi square test value:

Menu -> stat calculation -> create -> matrix -> number of rows: 2 , number of columns: 2 -> type in data -> ctrl -> var -> a -> enter -> menu-> stat -> stat test -> X^2 two way test -> observed matrix : a



Expected value:

Vars -> stat.exp matrix -> enter

Email: ib.team@hkexcel.com

6. Root of polynomials

$$x^3 - 2x^2 - x + 2$$

Casio:
Menu-> equa -> polynomial -> degree 3 -> a=1 , b=-2, c=-1, d=2 -> SOLV (F1)

Texas T1-84

Method 1 (Plysmth require) : Apps-> Plysmth -> Polyroot -> Degree 3 -> a=1 , b=-2, c=-1, d=2 -> solve

Method 2 (if plymth got deleted) : Plot graph , trace intersection

T1 inspire:
Menu-> algebra -> polynomial tools -> Find roots -> degree 2, root real -> a=1 , b=-2, c=-1, d=2

Email: ib.team@hkexcel.com

7. Simultaneous equation

$$\begin{cases} 2x + y = 10 \\ 3x - y = 5 \end{cases}$$

Casio:

Menu-> equa -> simultaneous -> number of unknown :2->

a	b	c
2	1	10
3	-1	5

Texas T1-84

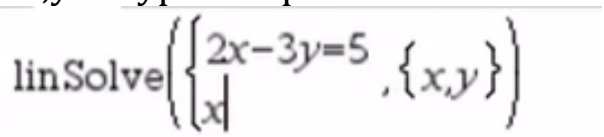
Method 1 (Plysmth require) : Apps-> Plysmth -> simultaneous-> unknown 2, equation: 2 ->

a	b	c
2	1	10
3	-1	5

Method 2 (if plymth got deleted) :
Plot graph 1 : y=10-2x
Plot graph 2: y=3x-5
2nd -> trace-> intersection -> move the point to the intersection -> enter

T1 inspire:

Menu-> algebra -> solve system of liner equation -> number of eq: 2, variables: x,y -> type in equation like this



Email: ib.team@hkexcel.com

8. Absolute sign

$$|2x|$$

Casio:
Home screen-> run Mat (top left) -> Mat (F4) -> Abs

Texas T1-84
Math -> NUM-> abs

T1 inspire:
Type in letter , abs(2x).

Email: ib.team@hkexcel.com

9. Graphing max min

$$x^3 + 3x^2 - 6x - 18 = 0$$

Casio:
Home screen-> graph -> type in equation -> Draw (F6)

Max: Gsolve (F5) -> Max
Min: Gsolve (F5) -> Min

Texas T1-84
Y= -> type in equation -> graph
Max: 2nd -> trace -> max - > move the point left to the max , move the second to the right of max -> enter
Min: 2nd -> trace -> min - > move the point left to the min , move the second to the right of min-> enter

T1 inspire:
Homescreen-> graph -> type in equation -> menu-> analyse graph -> max / min -> move the line left to the max/min , move the second line to the right of max/min

Email: ib.team@hkexcel.com

Give f(x) = $\frac{2x(x+1)^2}{3(x+2)^4}$. Find f'(1).

10. Integration

$$\int_1^3 \frac{e^{3x}}{(x+2)^2}$$

Casio:
Homecreen-> run mat-> math -> go next line (F6) -> $\int dx$ -> type in data

Texas T1-84
Math-> fnInt (scroll down) -> type in

T1 inspire:
Homescreen-> menu-> calculus -> Numerical integral

Email: ib.team@hkexcel.com