Extract of Maths au lycée Prévert

Tableur et variable aléatoire 1

- Ressources - Autour du tableur -

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Description:

Utilisation du tableur pour modéliser un jeu et conjecturer l'espérance du gan.

Enoncé :

Un jeu consiste à lancer un dé équilibré après avoir misé une somme de 2 Euros.

Si la face 4 apparait, on gagne 4 Euros ;

Sinon, on ne gagne rien.

Quel gain peut-on espérer à ce jeu ?

++++Simulation du jeu à l'aide du tableur openoffice :

▶ Dans la colonne A : on va simuler le lancer du dé, il faut donc obtenir un entier pris au hasard entre 1 et 6 ; le tableur openoffice propose la fonction Alea.Entre.Bornes.

Le contenu de la cellule A1 sera :

=Alea.Entre.Bornes(1 ;6)

▶ Dans la colonne B, on indique le montant que nous octroie le lancer du dé. On rappelle que :

Si la face 4 apparait, on gagne 4 Euros ; sinon, on ne gagne rien.

C'est ce que l'on va écrire dans la cellule B1 grâce à la commande SI de openoffice.

Ainsi la cellule B1 contient :

 =SI(A1=4 ;4 ;0)

C'est à dire que si la cellule A1 contient la valeur 4 alors la cellule B1 contiendra la valeur 4 sinon la cellule B1 contiendra la valeur 0.

▶ Dans la colonne C, on indique le gain du joueur, c'est à dire le montant reçu moins la mise de départ ; ainsi la cellule C1 contient :

 =B1-2

▶ Il ne reste plus qu'à recopier la ligne 1 jusqu'à la ligne 100 pour faire 100 simulations du jeu ;

▶ Pour calculer, l'espérance du gain, ou encore la moyenne des gains obtenus, on introduit dans la cellule C101 la formule :

=moyenne(C1:C100)

Rq : la syntaxe C1:C100 indique que l'on s'intéresse à la plage de cellules allant de C1 à C100 ; alors que la syntaxe C1 ;C100 indique que l'on s'intéresse uniquement aux deux cellules C1 et C100.

▶ On peut demander à l'ordinateur de refaire plusieurs fois cette 100-simulation, en appuyant simultanément sur les touches CTRL Maj F9.

On peut alors conjecturer que l'espérance de gain est ....(pas si simple à deviner pour une simulation sur 100 jeux)

Alors pourquoi ne pas simuler 1000 fois ce jeu ou plus ?

Il ne reste plus qu'à modéliser cette expérience à l'aide de la théorie des probabilités.

Voici en image la feuille de calcul :

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[Télécharger le plug-in Flash](#)

++++**Avec Geogebra**

Avec le tableur intégré à Geogebra, c'est tout à fait similaire mais les commandes sont légèrement différentes :

On utilise :
▶ la commande AléaEntreBornes[1, 6] pour générer un nombre aléatoire entre 1 et 6, et
▶ la commande =Si[A1 == 4, 4, 0] qui se transforme en =Si[A1 _ 4, 4, 0] après validation dans le tableur.
▶ pour relancer la simulation, il suffit d'appuyer sur la touche F9.

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CAEAAK8aAAAAAA=="}; // is3D=is 3D applet using 3D view, AV=Algebra View, SV=Spreadsheet View, CV=CAS
View, EV2=Graphics View 2, CP=Construction Protocol, PC=Probability Calculator, DA=Data Analysis, FI=Function
Inspector, PV=Python, macro=Macro View var views = {'is3D': 0,'AV': 0,'SV': 1,'CV': 0,'EV2': 0,'CP': 1,'PC': 0,'DA':
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++++ Prolongement tableur

On peut se demander quelle doit être la mise initiale pour espérer, en moyenne, ne pas perdre d'argent à ce jeu ?

Ici il faut utiliser l'adressage absolue (notation avec les $).

```
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[Télécharger le plug-in Flash](#)

++++Prolongement programmation :

Dans cet [article](#), on va créer un programme qui simule 100 jeux et affichera le gain du jeu. Puis, on calculera la moyenne des gains.