JumanjiS: The Jungle of SpreadLand

Sprego solutions in science and arts
Sprego megoldások a tudományokért

	Characters – *Sprego Joe* – *Browsers: Biff, Brent, Betsy, Bruce* – *The voice of the Gamemaster (GM)* – *if()* – *1-2 person(s) play(s) different roles in the different scenes* – *max()* – *sum()* – *average()* – *match()* – *index()* *Players* – *5 high school students* *Extras* – *10 extras (mushrooms, packages, doors)*		

	Set – *1 computer with monitor* – *1 chair* – *5 students, 1 student is sitting in front of the computer, the others are around him* – *the screen is projected onto the stage background* *5 students are sitting and standing in front of a computer and playing a computer game. Their monitor is projected onto the stage background.* *After a couple keypresses they complete Level 7 of the game. Their scores are displayed and Gamemaster (GM) announces that they've just completed this level.*		
GM	GG Well Played! You've completed Level 99! Congratulations! You are about to enter the last stage of the game. However, this time, you cannot skip SpreadLand, anymore. Do you want to take it on? Do you want to try, or give up? But you know that if you want to win, you must take it on.		
	Level 7 and the animation of congratulations is played on the screen. *From this point on most of the events happen parallel; on the left and on the right side of stage with two computers.*		
		Sprego Joe	Yes, of course. That's not even a question.
	Browsers are discussing the options.		
Biff	I don't want to play with Joe, he is crazy about Sprego.		

Brent	I'm a professional Excel user. That's not a big deal. I can find anything I need in the wizards and the helps. We don't have to do anything just click around, and Excel will solve the problems. It is so user-friendly. You guys, don't worry, we can do it together.		
Betsy	I'm in, but only if we can use a classic spreadsheet.		
Bruce	OK. I have an idea. Joe'll play alone and the four us will play together. What do you think?		
		Sprego Joe	That's OK with me. You play together, and I'll play on my own. Let's get going!
Browsers	He doesn't have any chance against us. Let's start.		
GM	Congratulations! Now you can enter SpreadLand. As I'm sure you have figured out, you have to solve spreadsheet tasks. You've decided that Sprego Joe will play alone and the four of you will play in the Browsers group.		
	The set is changed. *During the change the Browsers argue about the number of functions.*		
Biff	There are around 600 functions in Excel and they can solve all the problems. We are lucky to have this program.		
Brent	Yes, Biff is right. On top of that, all the functions are grouped into suitable sets. There's no problem finding them.		
		Sprego Joe	What does it matter how many built-in functions there are in spreadsheets? Do you use all of them?

Betsy	No, but, we need all of them. They're not there by accident.		
GM	Since this is the last stage of your game, there is going to be only one winner. In this game, you live or die! Do you want to continue? Then, press the red button.		
	The animation stops, and a huge red button appears on the monitor.		
Bruce	Fine, let's do it.		
Betsy	Are you sure?		
Brent	I love this game.		
Biff	It's just a spreadsheet, everyone can do it. What are you afraid of?		
Bruce	What's wrong with you? Of course, we'll continue. You want to give up just before our victory?		
Betsy	I don't think, you understand: the rules have changed. From now on, it's not us who play - we are played with! It might be dangerous. Let's vote. Who wants to continue?		
	Sprego Joe, Bruce, and Brent lift their hands. *Betsy seems worried.* *Biff shakes his head.*		
Biff	OK, you win. Three against two. Let's play along.		

	Someone presses the red button. *New set.* *SpreadLand with two different setups on the left and on the right side of the stage.* *The left side is for the classical spreadsheet: most of the spreadsheet functions are in balloons. The functions form the classic spreadsheet groups, with different colors for the different groups:* – *Our 10 most popular functions* – *Compatibility functions* – *Cube functions* – *Database functions* – *Date and time functions* – *Engineering functions* – *Financial functions* – *Information functions* – *Logical functions* – *Lookup and reference functions* – *Math and trigonometry functions* – *Statistical functions* – *Text functions* – *User defined functions that are installed with add-ins* – *Web functions* *The names of the functions are written on the balloons.* *Middle of the stage:* *A totem pole with 10 numbers: 484; 338; 120; 176; 1,062; 1,183; 100; 159; 87; 524; 9; 736.* *Two computers, screens projected onto the stage background. A spreadsheet of four columns is opened in German Excel. In column B there are the 10 numbers.*		*The right side is for Sprego: 12 spreadsheet functions on balloons.*

GM	This is a German Excel with 10 numbers in column B. In front of you there is a real totem pole with the same numbers. 10 bricks for the 10 numbers. You have to find the largest number in this column. The right brick is the key which opens the gate to the next task.		
Biff	Who cares which language? What's the problem? German is as good as English, or any other language. This is the task? It's for elementary school.		
		Sprego Joe	No!!!!!! There are huge differences! Be careful!
Biff	1183.		
	Biff pushes the brick with number 1183. *Sprego Joe wants to stop him, but he is too late.* *Biff fells to the ground and dies.*		
		Sprego Joe	Oh, you fool. He is gone, just because he didn't know that the comma in English is the thousand separator character; but in German and in other European languages the comma is the decimal character. In the German Excel, in column B 736 is the largest, while 1,062 is the smallest value.
			Sprego Joe goes to his functions. *Picks up the max() function.* *Sprego Joe and the max() function go together to his computer and create the formula.* *Sprego Joe and the max() function discuss the formula and they solve the problem together.*

		Sprego Joe	The max() function can work with one argument, which in this case is the vector of the numbers in column B.
		max()	To refer to a range, you must type a colon between the first and last cell of the range.
			Sprego Joe creates the formula in cell F2 and then evaluates it. The largest number – 736 – appears in cell F2.
		max()	Sprego Joe, how can you prove that instead of whole numbers, column B holds real numbers with the commas?
		Sprego Joe	That's simple. We just add 1 to all the numbers. The easiest way is to create an array formula.
			Sprego Joe selects the G2:G11 range. *Types the B2:B11+1 formula in G2 and then evaluates it.* *All the results appear in the range and now it is clear that the comma is the decimal character.*
Brent	I'd never thought of that.		
Betsy	And you create your formula extremely fast. How did you do it?		
		Sprego Joe	I use array formulas, so I don't have to copy the formulas. It is fast and safe.
	Brent presses the correct brick, the gate opens, and all of them go through the gate. *The set changes.* *The players are waiting for the second task.*		

GM	Congratulations. You've passed the first gate, but I'm really sorry for Biff. Now comes your second SpreadLand task. If you want to pass this task, you have to be more careful. Are you ready? To survive in the jungle, you must eat the right amount of food. The forest is full of mushrooms, but there are edible, poisonous, and fake mushrooms. You must find all the edible mushrooms and tell their numbers. If this number is correct you can go to the next task. You can tell the mushrooms apart by their colors. But we don't know the colors in advance. The game will select them at random.		
	An animation is played with flashing colors – red, yellow, and green – and then it stops at red.		
GM	Now, we have the colors. The poisonous mushrooms are yellow, the fake ones are green, and the edible ones are red. Calculate the number of red mushrooms.		
	A new spreadsheet document is opened on both computers. *In cells A2:A11 there are different colors.* *10 mushrooms are standing on the stage, wearing gray coats.* *To see their colors, the coats must be opened.* *The colors of their T-shirts match the "colors of the mushrooms".*		
	After the announcement Browsers run to their functions, aimlessly and frantically searching for functions and collecting all the functions which might work: countif(), countifs(), dcount(), dcounta().		

Brent	I've found it. countif() is the solution. It's easy.		
	S2 finds the countif() function balloon and runs to the computer with countif(). *He types his solution in the spreadsheet.* *He fills in the arguments of the function:* – *the first argument is the name of the vector (mushrooms),* – *the second argument is color.* *He does not type the string with the quotation marks.* *Brent presses Enter and dies.*	Sprego Joe	I have to figure out the selection question, first. Let's see. Oh, yes. Are the mushrooms red? I think, this is the right question.
	Betsy and Bruce are running with countif(), countifs(), dcount(), dcounta(), but stop when they see that Brent has used countif() and falls dead. *Brent's solution is still on their screen.*		*Sprego Joe goes to the mushrooms and checks their colors; unbuttons all the mushrooms.*
		Sprego Joe	Are you red? No. Yes. No. Yes. No. No. No. Yes. No. No.
			If the mushroom is red, he takes off the coat. Sprego Joe hangs a huge TRUE sign on the red mushrooms. *The others are rebuttoned and Sprego Joe hangs a huge FALSE sign on them.* *When he is ready, he goes to his computer and types the question.* *He evaluates the formula, and when he sees the correct output, he goes to his functions.*
Betsy	What's happened to Brent? And, and, … and why? countif() must be correct, I've found the same answer.		
	Betsy and Bruce are arguing.		*Sprego Joe works on his solution.*
Bruce	We might try countifs().		

Betsy	What is the difference between countif() and countifs()?		
Bruce	I don't know.		
Betsy	dcount() and dcounta() sound good also.		
Bruce	Where did you find them?		
Betsy	In the Database functions.		
Bruce	Where? But this table is not a database. Let's forget it.		
Betsy	This table can be a database.		
Bruce	It doesn't matter. But what was wrong Brent's solution?		
Betsy	Oh, yes. He missed the quotation mark around red.		
Bruce	It is that important? Of course, it is. Red is a string constant, so we have to put it into a pair of quotation marks.		
Betsy	Can we try countif() again?		
Bruce	I'm not sure, maybe, countifs().		
	Betsy and Bruce type countifs(), with red in a pair of quotation marks.		
		Sprego Joe	if(), please come with me. I've already checked all the mushrooms and marked them, but now you must continue. Please, select another marker which is the right one for counting. You know our task is to tell the number of the red mushrooms. Which marker do you want to use now?

		if()	I will give 1s to the good red mushrooms and ignore the others with their FALSEs.
		Sprego Joe	You don't want to mark the others?
		if()	No, we don't need to mark the yellow and the green mushrooms. They're no good. We just ignore them.
			While if() gives the 1s to the red mushrooms, Sprego Joe goes to his computer and types the if() function outside of the question. He evaluates the formula, checks the answers, and then goes to his functions and selects sum().
		Sprego Joe	sum() function, please come with me. We need to sum up the 1s and the FALSEs, which if() has given the mushrooms. Let's see the result.
			sum() function collects the marks, the 1s and the FALSEs.
		sum()	1 comes with me, FALSE doesn't matter, etc.
			Sprego Joe goes to his computer, types the sum() function outside of the if() function. *He evaluates the formula and everything works perfectly.* *The result is correct. Sprego Joe passes the gate with the others.* *All the players finish about the same time. While they are leaving the stage, they discuss the solutions.*
Betsy	Sprego Joe, do you know what the difference is between countif() and countifs()?		
		Sprego Joe	With only one condition, there is no difference between the two functions. However, if you have more than one condition with the AND connection between them, then you must use countifs().

Bruce	How did you solve the problem without these functions?		
		Sprego Joe	With simple functions: if() and sum(). First I asked a question. With this question I checked the colors of the mushrooms. Then the if() function marked the edible mushrooms with 1s and ignored the others. And finally, the sum() function adds up the output of the if() functions, which are the 1s.
Betsy	And what about dcount() and dcounta()? Can we solve the mushroom problem with them?		
		Sprego Joe	dcounta() is OK. It's a little bit overcomplicated, but it works. Because you must set up the criteria separately in a criteria grid. However, dcount() doesn't work in this case, because it only counts numbers, it cannot work with strings.
Betsy	How did you avoid the quotation marks?		
		Sprego Joe	Instead of the string constant, I used a variable, which holds the color. With this solution my formula will work with all the different colors, while yours only works with red.
Betsy	What is more than one condition? What is the AND connection?		
			We cannot hear the answer, because the players leave the stage.
	The scene changes and then comes the next task. Sprego Joe and the Browsers, Betsy and Bruce, are still in the game.		

GM	Browsers, it seems that you had a problem with the mushrooms, but finally you solved it, and you are still alive. Sprego Joe, your solution was fast and more general than the others. Congratulations! Now, you've reached the next stage. Here, you have to cross the river on a suspended bridge. You cannot leave your supplies here; you must take them with you. However, this is an old bridge, so the average weight of the supplies must be measured. Only those packages can be carried over which weigh less than 20 pounds, and then the average should be measured at the head of the bridge.		
	A new spreadsheet appears on the screen with data about the supply packages, in four data columns: – *name of the packages,* – *weight,* – *height,* – *circumference.* *Packages of different sizes appear on the stage.*		
GM	Now, you must apply a general formula to solve this problem. You cannot type the weight limit into your formula as a constant.		
	The Browsers run to their functions, aimlessly and frantically searching for functions and collecting all the functions which might work: averageif(), averageifs(), daverage(), average(), averagea().		
Browsers	They come back with the functions.		
			Sprego Joe goes directly to the supplies and asks their weight.

		Sprego Joe	Are you heavier than 20 pounds?
			Sprego Joe gives TRUE or FALSE sign to the packages. *When he finishes his questions he types his question in the Excel worksheet.* *When the formula is evaluated and correct, he goes to his functions.*
Bruce	What is the difference between these functions? Why do we need so many different functions? I am lost. Just take a look of Sprego Joe. He only has a dozen functions.		
Betsy	Don't worry. I know how to do it. The solution is very similar to the previous one. We start typing and Excel will finish it for us.		
Bruce	OK. Let's do it.		
	Betsy and Bruce start typing averageif()		
Betsy	Which one do you want to use: averageif() or averageifs()?		
			While Betsy and Bruce try to figure out something, Sprego Joe plays along with his functions.
		Sprego Joe	if() function, please come with me again. You have to mark the packages. How do you want to mark them?
		if()	I mark the small ones with the weights, while I ignore the big ones.

Bruce	I don't have the faintest idea. What is the difference?		*if() function hangs all the weight-papers and the FALSE-signs on the packages.* *While if() handles the signs, Sprego Joe types the if() function outside of the question, and evaluates it.* *The formula works.* *After that, Sprego Joe goes to his functions and collects the average() function.*
Betsy	I don't know it, either. Let's see the tool tips.		
	Betsy and Bruce check the tooltip of averageif().		
Bruce	I do not understand these expressions: range, criteria, [average_range]. And what are these brackets?		
Betsy	Me neither. Let's look at the tooltip for averageifs().		
Bruce	Oh, not again. This is different and even worse: average_range, criteria_range1, criteria1, [criteria_range2, criteria2], ... My God.		
		Sprego Joe	if() function, are you ready? Do you have all the packages' weights which are less than 20 pounds?
		if()	Yes. What can I do with them?
		Sprego Joe	Just give them to average() and he will calculate their average. That's all.
			if() meets average().
		average()	I'm here. Give me the vector with the weights and the ignored supplies. I'll calculate their average.

			Sprego Joe types average() outside of if() and evaluates his formula. *Sprego Joe's result appear on the screen. It is correct and accepted.*
		Sprego Joe	Yupee! We've made it.
Betsy	Let's try averageif(). It seems less complicated.		
	Betsy is uncertain, but tries averageif(). *They argue over the arguments and their order.* *Finally, they decide which is the range and the average range.*		
Betsy	Both the range and the average range is the weight. You see, it's easy.		
	Betsy types the range, the condition, and the average range.		
Betsy	We are ready.		
	Betsy hits Enter, cries, and falls down.		
Bruce	Oh, no. What's happened? Everything in its place. What's wrong? I cannot believe this.		
		Sprego Joe	Can I help you?
Bruce	Do you know how to solve it?		
	Sprego Joe goes to the Browsers' computer.		

Sprego Joe	I think I know. I hope I know. It is hard to tell, because the syntax of inequality is extremely difficult, and I cannot be sure about it. Let's see. Both the ranges are correct. However, you are wrong with the criterion. There is no explanation, but Excel treats the 'less than' operator as a string. So, we must put it into a pair of quotation marks and concatenate with the variable.		
	Sprego Joe types his solution.		
Bruce	Thank you very much for your help. And how did you solve it with your method?		
		Sprego Joe	First, I asked the very same question from all the packages: Are you less than 20 pounds? If the answer was true, the if() function marked them with their weight and ignored the heavy packages. And finally, the average() function calculated their average.
Bruce	It's easy. I think in the next task I will try your algorithm. You're golden.		
		Sprego Joe	You are most welcome.
	The set changes. *One row of extras with masks are the gates (doors).* *Below them there is another row of coins which symbolize the keys to the gates.*		

GM	Here comes your last task. You must find the key to exit. In the bottom row there are the key holes, while in the upper row there are doors. You have to match your key with the key holes. If the key matches, the door will slide down and open for you to exit the game. Be careful, in this task you have a time limit. If you do not finish it in 3 minutes, or your solution is not correct, you die.		
	Just as usual Browser – now Bruce on his own – searches frantically for the functions which might work. *Sprego Joe thinks over the problem and goes to his functions.*		
Bruce	I have so many functions. How can find the one which I need to find the exit? This task is so different from the others. I cannot even use the previous algorithm. OK. I must calm down and think. We are searching for the key hole, so any search or find function would work. Let's see what we have here. search() function. That sounds good.		
	Bruce tries search(), the wizard, the help, the tooltip. find(), choose(), vlookup(), hlookup()	Sprego Joe	First, we must know which is the right key. We can use both the if() and the match() functions. However, we only have one solution. That's for sure. I think match() is easier in this case.
			Sprego ponders a little bit.
		Sprego Joe	To tell this number, I'm going to use the match() function. Let's do it.

Bruce	Oh, not again. I don't understand the wizard or the tooltip. Think, think, and think.		*Sprego Joe collects match().*
		match()	If you give me your key I will check all the key holes for you and at the first match I will tell you the index of the right key hole.
			match() tries the keys, starting from the first one. *In the meantime, Sprego Joe types his match() function.* *The function returns the index of the key.*
Bruce	search() and find() work only on strings. Now we have two vectors of coins and doors. They are not strings. vlookup() would be good if we rearrange the two vectors. All we have to do to turn them into two totem poles. Similar to the one we had in the first task. However, it is impossible, we cannot move the doors. They are carved into the hill. OK, then hlookup(). Oh, yes, yes, yes. hlookup(), horizontal lookup is perfect. Why didn't I think of this before?		
	Bruce tries hlookup() in the spreadsheet, but it doesn't work.	Sprego Joe	Now we know the index. After that we need the function to find the correct door. It's simple. We know the index and now we need the index() function.
Bruce	I don't understand. Both the coins and the doors are arranged horizontally. That's for sure. And so what's wrong? I have no idea. Everything looks perfect, but something is still not there.		*Sprego Joe goes to his functions and collects index().*

	Bruce types the third argument, and finally his formula is syntactically correct. It is accepted. *There is an output value: Door10.* *He runs to the 10th door, tries to open it, but it doesn't work.* *He is nervous and he is afraid of the consequences.* *In the meanwhile Sprego Joe works on his solution.*	index()	What do I have to find? What is the output vector?
		Sprego Joe	There is the vector of the doors and match() has just given us the index of the right key. That's all you need.
		index()	You are 100% correct.
Bruce	Everything looks perfect, but the gate doesn't open. Let's try something else. But what is "row index number"? What is "range lookup"? I don't understand. Oh, no. I'll be late. I cannot believe this.		*index() goes to the doors.* *Sprego Joe types the index() function outside of match(), fills in the missing argument, and evaluates the formula.* *The door slides down, opens, and Sprego Joe can pass through.* *Firework, etc.*
	Bruce tries several solutions, and keeps running back and forth between his computer and the doors. *Sprego Joe thinks over the algorithm and then starts collecting the functions he needs from his group.* *The gates close on Bruce.* *GM starts his announcement.*		
GM	Congratulations! Sprego Joe, you are amazing! The winner of SpregoLand and the winner of the game is Sprego Joe! Stand up for the winner!		