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                                generate_n_random_categories_3D
function [X Y Z data_array] = generate_n_random_categories_3D(base, adjustment,
min_spread, max_spread, num_items, num_categories, power, function_type)

i = 0;
cnt = 0;

items_per_category = ceil(num_items/num_categories);

while(i <= num_categories && cnt < num_items)

    j = 0;

    spread = min_spread + i*((max_spread - min_spread)/num_categories);
    i = i + 1;

    x_base = rand()*base + i*adjustment;
    y_base = rand()*base + i*adjustment;

    if(function_type == 0)

        z_base = (.5*x_base + .5*y_base)^power;

    else

        z_base = sin(.5*x_base + .5*y_base);

    endif

    while(j <= items_per_category && cnt < num_items)

        j = j + 1;
        cnt = cnt + 1;

        exponent = floor(rand()*1.9999); %produces either 0 or 1
        x = x_base + rand()*spread*(-1)^exponent;

        exponent = floor(rand()*1.9999);
        y = y_base + rand()*spread*(-1)^exponent;

        exponent = floor(rand()*1.9999);
        z = z_base + rand()*spread*(-1)^exponent;

        data_array{cnt} = [x y z];

        X(i) = x;
        Y(i) = y;
        Z(i) = z;

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        generate_n_random_categories_3D
    endwhile
endwhile
endfunction
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