

```
# 3d array assignment
import random
```

```
def get_positive_int(prompt):
    while True:
        text = input(prompt).strip()
        if text.isdigit() and int(text) > 0:
            return int(text)
        print("Please enter a positive whole number.")
```

```
def make_array(layers, rows, cols):
    arr = []
    for i in range(layers):
        layer = []
        for j in range(rows):
            row = []
            for k in range(cols):
                row.append(random.randint(1, 9))
            layer.append(row)
        arr.append(layer)
    return arr
```

```
def print_array(arr):
    for i in range(len(arr)):
        print("Layer", i)
        for row in arr[i]:
            line = ""
            for n in row:
                line += f"{n:4}"
            print(line)
    print()
```

```
def total(arr):
    s = 0
    for layer in arr:
        for row in layer:
            for n in row:
                s += n
    return s
```

```
def count_values(arr):  
    return len(arr) * len(arr[0]) * len(arr[0][0])
```

```
def average(arr):  
    return total(arr) / count_values(arr)
```

```
def find_max(arr):  
    best = arr[0][0][0]  
    spot = (0, 0, 0)  
    for i in range(len(arr)):  
        for j in range(len(arr[i])):  
            for k in range(len(arr[i][j])):  
                if arr[i][j][k] > best:  
                    best = arr[i][j][k]  
                    spot = (i, j, k)  
    return best, spot
```

```
def find_min(arr):  
    best = arr[0][0][0]  
    spot = (0, 0, 0)  
    for i in range(len(arr)):  
        for j in range(len(arr[i])):  
            for k in range(len(arr[i][j])):  
                if arr[i][j][k] < best:  
                    best = arr[i][j][k]  
                    spot = (i, j, k)  
    return best, spot
```

```
def layer_sums(arr):  
    sums = []  
    for layer in arr:  
        s = 0  
        for row in layer:  
            s += sum(row)  
        sums.append(s)  
    return sums
```

```
def count_evens(arr):
```

```
evens = 0
for layer in arr:
    for row in layer:
        for n in row:
            if n % 2 == 0:
                evens += 1
return evens
```

```
def add_arrays(a, b):
    result = []
    for i in range(len(a)):
        layer = []
        for j in range(len(a[i])):
            row = []
            for k in range(len(a[i][j])):
                row.append(a[i][j][k] + b[i][j][k])
            layer.append(row)
        result.append(layer)
    return result
```

```
def scale_array(arr, factor):
    result = []
    for layer in arr:
        new_layer = []
        for row in layer:
            new_row = []
            for n in row:
                new_row.append(n * factor)
            new_layer.append(new_row)
        result.append(new_layer)
    return result
```

```
def main():
    print("=== 3D Array Calculator ===")
    layers = get_positive_int("Number of layers: ")
    rows = get_positive_int("Number of rows: ")
    cols = get_positive_int("Number of columns: ")

    a = make_array(layers, rows, cols)
    b = make_array(layers, rows, cols)
```

```
print("\nArray A")
print_array(a)
print("Array B")
print_array(b)
```

```
print("Total of A:", total(a))
print("Average of A:", round(average(a), 2))
value, spot = find_max(a)
print("Largest value in A:", value, "at (layer, row, col)", spot)
value, spot = find_min(a)
print("Smallest value in A:", value, "at (layer, row, col)", spot)
print("Sum of each layer in A:", layer_sums(a))
print("Even numbers in A:", count_evens(a))
```

```
print("\nA + B")
print_array(add_arrays(a, b))
```

```
factor = get_positive_int("Multiply A by: ")
print(f"\nA x {factor}")
print_array(scale_array(a, factor))
```

```
if __name__ == "__main__":
    main()
```