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3.49

$$\sum_{j=1}^{N}(X_j - 1)^2 = \sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N$$

To show the equality of the equation above, we can use the **inductive method** .

First, let's get the inductive form of our equation.

$$\sum_{j=1}^{N}(X_j - 1)^2$$

inductive method

$$\sum_{j=1}^{N+1}(X_j - 1)^2 = \sum_{j=1}^{N}(X_j - 1)^2 + (X_{N+1} - 1)^2$$
$$= \sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N + (X_{N+1} - 1)^2$$

Now, let's get the inductive form our right hand equation.

$$\sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N$$

inductive method

$$= \sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N + 1$$
$$= \sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N + \left(X_{N+1}^2 - 2_{N+1} + (X_{N+1} - 1)^2\right)$$
$$= \sum_{j=1}^{N} X_j^2 - 2\left(\sum_{j=1}^{N} X_j\right) + N + (X_{N+1} - 1)^2$$

We have then shown that the equation

$$\sum_{j=1}^{N}(X_j^2 - 1)^2 = X_j^2 - 2X_j + N$$

Is indeed equal for its inductive form. QED

3.50 (a-g)

a.) $\sum UV$

$$= \sum_{n=1}^{3} (U_n V_n)$$

$$= (3 \cdot (-4)) + (-2 \cdot (-1)) + (5 \cdot (6))$$

$$= -12 + 2 + 30$$

$$\boxed{= 20}$$

a.) 20

b.) $\sum (U+3)(V-4)$

$$= \sum_{n=1}^{3} (U_n + 3)(V_n - 4)$$

$$= (3+3)(-4-(4)) + (-2+3)(-1-(4)) + (5+3)(6-4)$$

$$= (6)(-8) + (1)(-5) + (8)(2)$$

$$= -48 + (-5) + 16$$

$$\boxed{= -37}$$

b.) -37

c.) $\sum V^2$

$$= \sum_{n=1}^{3} (V_n)^2$$

$$= (-4)^2 + (-1)^2 + (6)^2$$

$$= 16 + 1 + 36$$

$$\boxed{= 53}$$

a.) 53

d.) $(\sum U)(\sum V)^2$

$$= \sum_{n=1}^{3} U_n \cdot \left(\sum_{n=1}^{3} V_n\right)^2$$

$$= \left[\sum_{n=1}^{3} U_n = (3 + (-2) + 5)\right] \left[\sum_{n=1}^{3} V^2 = (-4 + -1 + 6)^2\right]$$

$$= (6)(1)^2$$

$$= (6)(1)$$

$$\boxed{= 6}$$

d.) 6

e.) $\sum_{n=1}^{3} uv^2$

$= 3(-4)^2 + (-2)(-1)^2 + (5)(6)^2$

$= (3)(16) + (-2)(1) + (5)(36)$

$= 48 + 2 + 180$

$\boxed{= 230}$

e.) 230

f.) $\sum_{n=1}^{3} (u^2 - 2(v^2) + 2)$

$= ((3)^2 - 2(-4)^2 + 2) + ((-2)^2 - 2(-1)^2 + 2) + ((5)^2 - 2(6)^2 + 2)$

$= (((9) - 2(16) + 2) + (4 - 2(1) + 2) + (25 - 2(36) + 2)$

$\boxed{= 62}$

f.) 62

g.) $\sum_{n=1}^{3} \left(\frac{u}{v}\right)$

$= \frac{3}{-4} + \frac{^-2}{-1} + \frac{5}{6}$

$\boxed{= \frac{25}{12}}$

g.) $^{25}/_{12}$

3.90 a

In [1]:

```
a_SET= [3, 5, 8, 3, 7, 2]
a_SET

a_SET_length= len(a_SET)
a_SET_length

prod_a_SET=1

for i in a_SET:
    prod_a_SET *= i

print("Product of set:", prod_a_SET)
Geomean_a_SET= ((prod_a_SET)**(1/a_SET_length))
Geomean_a_SET
print("Geometric Mean:", Geomean_a_SET)
```

```
Product of set: 5040
Geometric Mean: 4.140680833465288
```

In [2]:

```
sum_a_SET=0

for i in a_SET:
    sum_a_SET += i

Arithmean_a_SET= (((1/a_SET_length)*(sum_a_SET)))
print("Arithmetic Mean:", Arithmean_a_SET)
```

```
Arithmetic Mean: 4.666666666666666
```

3.90 b

In [3]:

```
b_SET= [28.5, 73.6, 47.2, 31.5, 64.8]
b_SET

b_SET_length= len(b_SET)
b_SET_length

prod_b_SET=1

for i in b_SET:
    prod_b_SET *= i


print("Product of set:", prod_b_SET)
Geomean_b_SET= ((prod_b_SET)**(1/b_SET_length))
print("Geometric Mean:", Geomean_b_SET)
```

```
Product of set: 202092516.864
Geometric Mean: 45.82579906814073
```

In [4]:

```
sum_b_SET=0

for i in b_SET:
    sum_b_SET += i

Arithmean_b_SET= (((1/b_SET_length)*(sum_b_SET)))

print("Arithmetic Mean:", Arithmean_b_SET)
```

```
Arithmetic Mean: 49.120000000000005
```