



CANDIDATE

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TEST

# DAT540 1 Introduksjon til datavitenskap

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**Section 1**

Question	Question title	Question type
<b>i</b>	Information	Information or resources
1	Question 1	Multiple Choice
2	Question 2	Multiple Choice
3	Question 3	Multiple Choice
4	Question 4	Multiple Choice
5	Question 5	Multiple Choice
6	Question 6	Multiple Choice
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9	Question 9	Multiple Choice
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11	Question 11	Multiple Choice
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33	Question 33	Multiple Choice
34	Question 34	Multiple Choice
35	Question 35	Multiple Choice
36	Question 36	Multiple Choice
37	Question 37	Multiple Choice
38	Question 38	Multiple Choice
39	Question 39	Multiple Choice
40	Question 40	Multiple Choice

## 1 Question 1

For the following code, which output is going to be displayed

```
try:
    lis = 3*[1]+1*[3]
    x = lis[10]
    print('A!')
except IndexError:
    print('B! ')
else:
    print('C!')
finally:
    print('D!')
```

Select the best alternative:

- ☐ A! & D!
- ☐ C! & D!
- ☒ B! & D!
- ☐ B!

## 2 Question 2

For the following code, which output is going to be displayed ?

```
a = [i for i in range(10)]
b = a
a += [2]
print(b)
```

Select the best alternative:

- ☐ None of the options
- ☐ [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 2]
- ☒ [2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
- ☐ [0, 1, 2, 2, 3, 4, 5, 6, 7, 8, 9]

### 3 Question 3

For the following code, which output is going to be displayed ?

```
a = 20
a -= 18
a == 3
a *= 6
a //= 6
print(a)
```

Select the best alternative:

- ☐ 2
- ☐ None of the options
- ☐ 0
- ☒ 3

### 4 Question 4

For the following code, which output is going to be displayed ?

```
a = "Is it true or false ?"
a = a[6:][-7:-2]
print(a.title())
```

Select the best alternative:

- ☒ None of the options
- ☐ False
- ☐ FALSE
- ☐ Error message

## 5 Question 5

Which code snippet will give this answer : {1: 14, 2: 13, 3: 12, 4: 11}

Select the best alternative:

☒ All of the options

```
keys = tuple(range(1,5))
```

```
values = tuple(range(11,15))[::-1]
```

☐

```
dict_comp = {key: value for key, value in zip(keys, values)}  
print(dict_comp)
```

```
keys = tuple(range(1,5))
```

```
values = tuple(range(11,15))[::-1]
```

☐

```
mapping = dict(zip(keys, values))  
print(mapping)
```

```
keys = tuple(range(1,5))
```

```
values = tuple(range(11,15))[::-1]
```

```
mapping = {}
```

☐

```
for key, value in zip(keys, values):  
    mapping[key] = value  
print(mapping)
```

## 6 Question 6

What will be the output of the following code?

```
arr = np.array([2, 4, 1, 8, 5])  
print(np.sort(arr)[::-1])
```

Select the best alternative:

- ☒ [8, 5, 4, 2, 1]
- ☐ [5, 4, 2, 1, 8]
- ☐ [1, 2, 4, 5, 8]
- ☐ [8, 5, 4, 1, 2]

## 7 Question 7

Given the following code block, which statement is true?

```
heroes = np.array([["Thor", 10],  
                  ["Spider-Man", 8],  
                  ["Iron Man", 7]], dtype=object)  
  
sorted_heroes = heroes[heroes[:,1].argsort()]
```

Select the best alternative:

- ☒ "Spider-Man" will be the first row in sorted\_heroes.
- ☐ "Iron Man" will be the last row in sorted\_heroes.
- ☐ "Iron Man" will be the first row in sorted\_heroes.
- ☐ "Thor" will be the first row in sorted\_heroes.

## 8 Question 8

For the code below, which statement about the variable result is true?

```
arr = np.array([[1,2],  
               [3,4],  
               [5,6]])  
  
vec = np.array([2,2])  
result = arr / vec
```

Select the best alternative:

- ☒ The first row of result contains values [0.5, 1].
- ☐ None of the options
- ☐ result contains values only multiplied by 2.
- ☐ result is a 2x2 matrix.



## 9 Question 9

	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

To visualize the distribution of the Speed attribute using a histogram, which modification needs to be made to the below code?

```
plt.hist(df['Intelligence'], bins=10, color='blue', edgecolor='black')
```

Select the best alternative:

- ☒ Replace 'Intelligence' with 'Speed'.
- ☐ Change the bins parameter to 20.
- ☐ Replace 'blue' with 'red'.
- ☐ Remove the edgecolor parameter.

## 10 Question 10

df:

	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

After reading the dataset `characters_stats.csv` using pandas into `df` as shown above, which code will display the first 5 rows?

Select the best alternative:

- ☐ `df.read().head()`
- ☒ None of the options
- ☐ `df.top(5)`
- ☐ `print(df.head())`

## 11 Question 11

Given df:

	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

How will you modify the below code to visualize the relationship between Strength and Durability?

```
plt.scatter(df['Intelligence'], df['Combat'], alpha=0.5)
```

Select the best alternative:

- ☐ Add the parameter color='red'.
- ☐ Replace 'Combat' with 'Durability'.
- ☒ Both a) and b).
- ☐ Replace 'Intelligence' with 'Strength'.

## 12 Question 12

Given this code:

```
sns.boxplot(x='Alignment', y='Power', data=df)
```

Which plot will be produced?

Select the best alternative:

- ☐ A scatter plot showing the relationship between Alignment and Power
- ☐ A bar plot comparing the average Power of each Alignment.
- ☐ A histogram showcasing the distribution of Power.
- ☒ A boxplot displaying the spread of Power for each Alignment.

### 13 Question 13

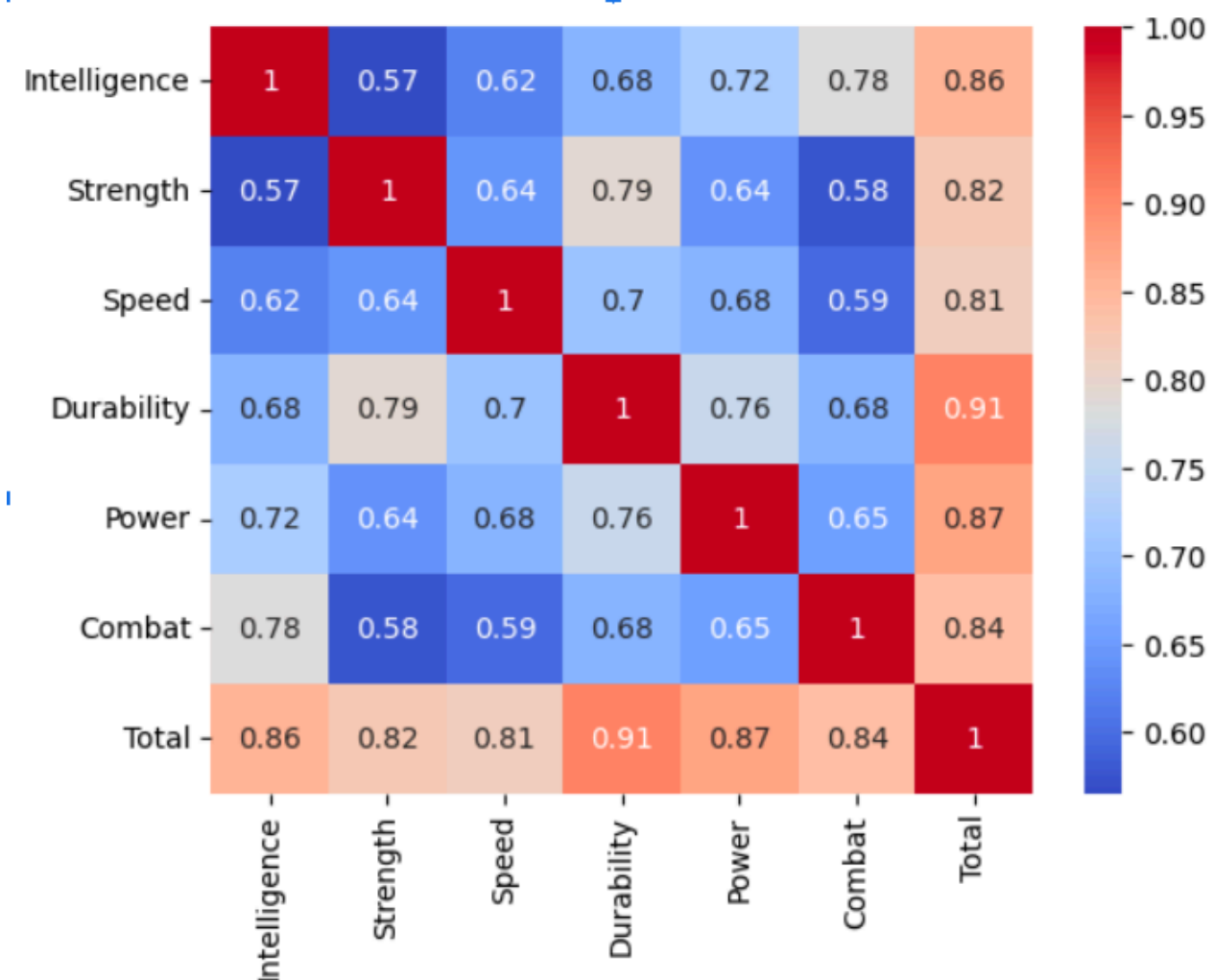
df:

	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

Given the correlation heatmap generated from:

```
corr = df.corr()
sns.heatmap(corr, annot=True, cmap='coolwarm')
```

Which statement can be deduced about the relationship between Strength and Durability?



Which statement can be deduced about the relationship between Strength and Durability?

**Select the best alternative:**

- ☐ A positive correlation indicates that as Strength increases, Durability tends to decrease.
- ☐ A negative correlation value implies that as Strength increases, Durability also tends to increase.
- ☐ If the heatmap shows a blue color for the intersection of Strength and Durability, they likely have a strong positive correlation.
- ☒ A positive correlation value implies that as Strength increases, Durability also tends to increase.

## 14 Question 14

What will be the output of the following program:

```
def modify_list(my_list, my_tuple, my_dict):  
    my_tuple = (9, 8, 7)  
    my_dict['key'] = 'new_value'  
  
my_list = [1, 2, 3]  
my_tuple = (4, 5, 6)  
my_dict = {'key': 'value'}  
  
modify_list(my_list, my_tuple, my_dict)  
print(my_list[0], my_tuple[0], my_dict['key'])
```

**Select the best alternative:**

- ☐ 999 4 new\_value
- ☒ 1 4 value
- ☐ 1 9 new\_value
- ☐ 999 9 new\_value

## 15 Question 15

Given two lists:

```
list1 = ["apple", "banana", "cherry"]  
list2 = ["orange", "mango", "blueberry"]
```

Which command will produce the following results of list1?: *['apple', 'banana', 'cherry', 'orange', 'mango', 'blueberry']*

**Select the best alternative:**

- ☐ list1.push(list2)
- ☐ list1.insert(list2)
- ☐ list1.extend(list2)
- ☒ list1.append(list2)

## 16 Question 16

What will be the output of the `arr[[1,4,2]][:, [0,4,2]]` given the following:

```
import numpy as np

arr = np.arange(25).reshape(5,5)
print(arr)

"""Output:

[[ 0  1  2  3  4]
 [ 5  6  7  8  9]
 [10 11 12 13 14]
 [15 16 17 18 19]
 [20 21 22 23 24]]
"""
```

Select the best alternative:

☐ `array([[ 5, 8, 7],  
 [15, 18, 17],  
 [10, 13, 12]])`

☐ `array([ 5, 24, 12])`

☒ `array([[ 5, 9, 7],  
 [20, 24, 22],  
 [10, 14, 12]])`

☐ `array([ 5, 18, 12])`

## 17 Question 17

What is the output of the following program:

```
import numpy as np
array1 = np.array([1, 2, 3])
array2 = np.array([4, 5, 6])
stacked_array = np.stack((array1, array2))
print(stacked_array)
```

Select the best alternative:

- ☐ None of the options
- ☐ [[1, 2, 3], [4, 5, 6]]
- ☐ [1, 2, 3, 4, 5, 6]
- ☒ [[1, 4], [2, 5], [3, 6]]

## 18 Question 18

Which of the following will add a column to the following DataFrame.

```
data = {'Date': pd.date_range(start='2023-01-01', periods=10, freq='D'),
        'Value': [2.1, 3.2, 4.1, 2.8, 5.5, 6.3, 8.2, 7.7, 9.0, 10.1]}

df = pd.DataFrame(data)
```

Let the name of the column is SMA and SMA will take the average of the Value for 3 rows at a time (previous 2 rows + current row)

Select the best alternative:

- ☒ df['SMA'] = df['Value'].rolling(window=3).mean()
- ☐ df['SMA'] = df['Value'].shift(window=3).mean()
- ☐ None of the options
- ☐ df['SMA'] = df['Value'].resample('D').groupby(3).mean()



## 19 Question 19

Consider a pandas DataFrame 'df' with a column named "scores" containing numerical values. Which of the following statement will correctly categorize these scores into three equal-sized bins based on their values?

**Select the best alternative:**

- ☐ None of the options
- ☒ `df['score_bins'] = pd.qcut(df['scores'], q=3, labels=False)`
- ☐ `bin_edges = [0, 50, 70, 100]`  
`df['score_bins'] = pd.cut(df['scores'], bins=bin_edges, labels=False)`
- ☐ `df['score_bins'] = pd.cut(df['scores'], bins=3, labels=False)`

## 20 Question 20

What is a characteristic feature of Supervised Machine Learning?

**Select the best alternative:**

- ☒ The algorithm learns from labeled training data.
- ☐ None of the options
- ☐ It relies on clustering techniques.
- ☐ The algorithm operates without any training data.

## 21 Question 21

For a dictionary `new_dict = {0: "airplane", 1: "bird", 2: "cat", 3:"dog"}`, Which of the following statements will retrieve only the values?

- A. `[i[1] for i in new_dict.items()]`
- B. `new_dict.values()`
- C. `list(map(lambda x: x[1], new_dict.items()))`

**Select the best alternative:**

- ☐ All of the options
- ☐ B & C
- ☒ A & B
- ☐ A & C

## 22 Question 22

Which of the following code snippets correctly opens a file named "data.txt" in read-only mode and prints its content?

Select the best alternative:

☐ `file = open("data.txt", "w")  
print(file.read())  
file.close()`

☒ None of the options

☐ `file = open("data.txt", "rw")  
print(file.read())  
file.close()`

☐ `file = open("data.txt", "a")  
print(file.read())  
file.close()`

## 23 Question 23

For the following code, which output is going to be displayed ?

```
a = True + True + False + True  
b = True + False + True + False  
print(a+b)
```

Select the best alternative:

☐ 8

☐ True, True, True, True, True, True, True, True

☐ None of the options

☒ True, True, False, True, True, False, True, False

## 24 Question 24

For the following code, which output is going to be displayed ?

```
count = 1
def f(n):
    global count
    count -= 1
    word = "yes"
    while count < n:
        word *= 2
        count += 1
    print(word)

f(2)
```

Select the best alternative:

- ☐ None of the options
- ☐ Error message
- ☐ yyyyyeeessss
- ☒ yesyesyesyes

## 25 Question 25

Which code snippet will give the answer: "4" ?

```
# A.  
import numpy as np  
A = np.array([[2, 1, 0], [2, 2, 0], [0, 4, 0]])  
print(np.count_nonzero(A == 0))  
## Count_nonzero function counts number of non-zero values in an array.  
  
# B.  
import numpy as np  
A = np.array([[2, 1, 0], [2, 2, 0], [0, 4, 0]])  
print(np.sum(A == 0))  
  
# C.  
import numpy as np  
A = np.array([[2, 1, 0], [2, 2, 0], [0, 4, 0]])  
print(sum(x == 0 for row in A for x in row))
```

Select the best alternative:

- ☒ All of the options
- ☐ A
- ☐ A and B
- ☐ B and C

## 26 Question 26

Which code snippet will give the answer: `[1, 2, 3, 4, 5, 6]`

```
# A.  
grades = [0, 1, 2, 3, 4, 5]  
for grade in grades:  
    grade += 1  
print(grades)  
  
# B.  
grades = [0, 1, 2, 3, 4, 5]  
for i in range(len(grades)):  
    grades[i] += 1  
print(grades)  
  
# C.  
grades = [0, 1, 2, 3, 4, 5]  
grades = [grade+1 for grade in grades]  
print(grades)
```

Select the best alternative:

- ☒ All of the options
- ☐ A
- ☐ A and B
- ☐ B and C

## 27 Question 27

For the following code, which output is going to be displayed ?

```
t = (1, 2, 3, 4, 5)
for i in range(4):
    t[i] += 1
    t[i] *= 2
print(t)
```

Select the best alternative:

- ☐ [4, 6, 8, 10, 12]
- ☒ [2, 4, 6, 8, 10]
- ☐ [2, 3, 4, 5, 6]
- ☐ Error message

## 28 Question 28

Which of the code snippet will give this answer: ['S', 'F']

```
# A
a = "Stay Focused"
def f(x):
    a = []
    for v in x:
        if len(v) > 0 and v[0].isupper():
            a.append(v)
    return a
print(f(a))

# B
a = "Stay Focused"
sol = [i for i in a if len(i) > 0 and i[0].isupper()]
print(sol)

# C
a = "Stay Focused"
sol = [s for s in a if len(s) > 0]
print(sol)

# D
a = "Stay Focused"
sol = list(filter(lambda w : w.istitle(), a))
print(sol)
```

Select the best alternative:

- ☒ A and B and D
- ☐ B and C and D
- ☐ B and D
- ☐ All of the options



## 29 Question 29

For the following code, which output is going to be displayed ?

```
s = {1, 2, 3, 4, 5}
s.add(2)
s.add(4)
print(s)
```

Select the best alternative:

- ☐ Error message
- ☒ {1, 2, 3, 4, 5, 2, 4}
- ☐ {1, 2, 3, 4, 5}
- ☐ {1, 2, 2, 3, 4, 4, 5}

## 30 Question 30

For the following code, which output is going to be displayed ?

```
s = "Easy Master"
res = {}
for i in s:
    if i not in res:
        res[i] = 1
    else:
        res[i] += 1
print(res)
```

Select the best alternative:

- ☒ {'E': 1, 'a': 2, 's': 2, 'y': 1, ' ': 1, 'M': 1, 't': 1, 'e': 1, 'r': 1}
- ☐ {'E': 1, 'a': 2, 's': 2, 'y': 1, 'M': 1, 't': 1, 'e': 1, 'r': 1}
- ☐ {'e': 2, 'a': 2, 's': 2, 'y': 1, 'm': 1, 't': 1, 'r': 1}
- ☐ {'e': 2, 'a': 2, 's': 2, 'y': 1, ' ': 1, 'm': 1, 't': 1, 'r': 1}

### 31 Question 31

For the following code, which output is going to be displayed ?

```
import numpy as np

score_QCM = np.matrix("35, 12, 67, 45, 22, 43, 10, 36, 58").reshape(3,3)
score_QCM1 = score_QCM[:,0:2]
res = score_QCM1.max(axis=0)
print(res)
```

Select the best alternative:

- ☒ `[[67 58]]`
- ☐ `[[45 36]]`
- ☐ `[45 36]`
- ☐ `[67 58]`

### 32 Question 32

After executing the code below, what will the shape of matrix be?

```
matrix = np.random.rand(4, 3)
```

Select the best alternative:

- ☐ (3, 4)
- ☐ (4, 3)
- ☒ (1, 12)
- ☐ (12, 1)

### 33 Question 33

Consider a Pandas DataFrame **df** with a datetime column 'timestamp' and a numeric column 'value'. Write a Python code snippet to resample the time series data to a monthly frequency and calculate the mean of 'value' for each month.

**Select the best alternative:**

- ☐ None of the options
- ☒ `df_resampled = df['value'].groupby(df['timestamp'].dt.to_period("M")).mean()`
- ☐ `df_resampled = df.resample('monthly').average()`
- ☐ `df_resampled = df.resample('M').mean()`

## 34 Question 34

df:

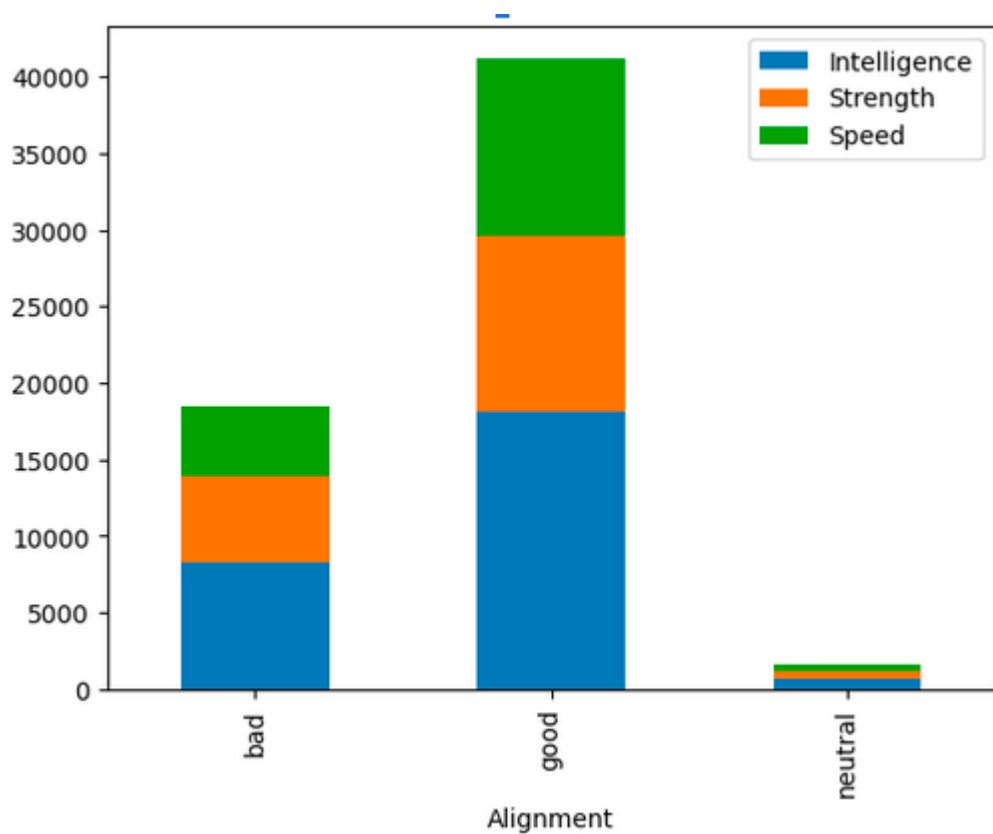
	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

After executing the following code block:

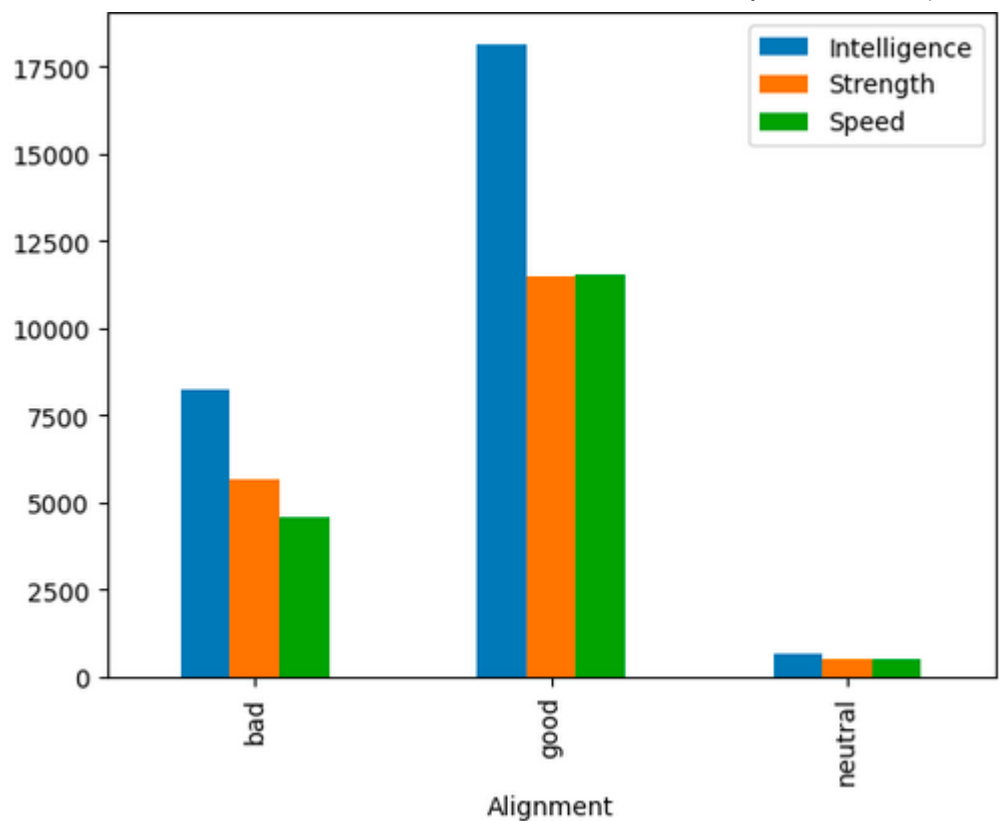
```
df_grouped = df.groupby('Alignment').sum()
df_grouped[['Intelligence', 'Strength', 'Speed']].plot(kind='bar', stacked=True)
```

Which statement is accurate based on the resultant plot?

A.



B.

**Select the best alternative:**

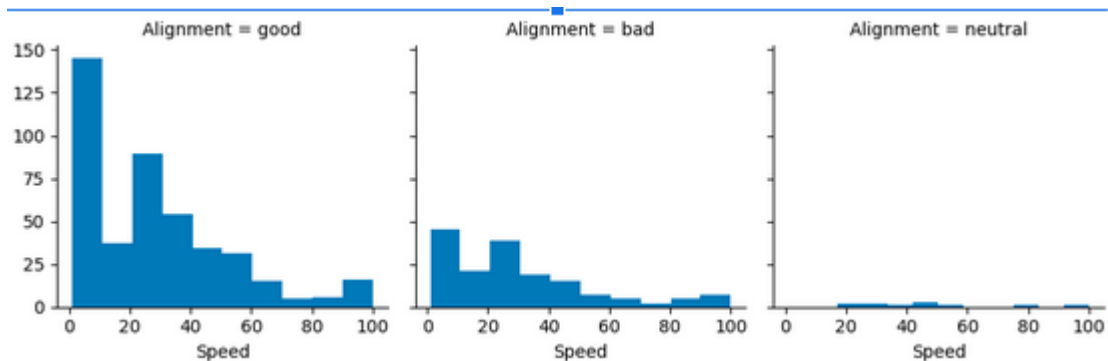
- ☐ The height of the entire stacked bar for a specific 'Alignment' gives the average of the three attributes for characters of that alignment.
- ☐ Each individual attribute ('Intelligence', 'Strength', 'Speed') will have a separate bar plot for each 'Alignment'.
- ☒ The resulting plot will look like the one shown for **A**
- ☐ The resulting plot will look like the one shown for **B**

## 35 Question 35

df:

	Name	Alignment	Intelligence	Strength	Speed	Durability	Power	Combat	Total
0	3-D Man	good	50	31	43	32	25	52	233
1	A-Bomb	good	38	100	17	80	17	64	316
2	Abe Sapien	good	88	14	35	42	35	85	299
3	Abin Sur	good	50	90	53	64	84	65	406
4	Abomination	bad	63	80	53	90	55	95	436

To display multiple histograms for Speed for each Alignment, which FacetGrid code should you use?



Select the best alternative:

☐ `g = sns.FacetGrid(df, row='Alignment')`  
`g.map(plt.bar, 'Speed')`

☒ `g = sns.FacetGrid(df, col='Speed')`  
`g.map(plt.hist, 'Alignment')`

☐ `g = sns.FacetGrid(df, col='Alignment')`  
`g.map(plt.hist, 'Speed')`

☐ `g = sns.FacetGrid(df, row='Speed')`  
`g.map(plt.hist, 'Alignment')`

### 36 Question 36

How can you calculate the dot product of two NumPy arrays **a** and **b**? The arrays have matching inner dimensions.

**Select the best alternative:**

- ☐ a @ b
- ☐ a.dot(b)
- ☐ np.dot(a, b)
- ☒ All of the options

### 37 Question 37

Without creating a custom dtype, which of the following statements is **true** about a NumPy array?

**Select the best alternative:**

- ☐ It is a one-dimensional data structure only.
- ☐ It can only have elements of the same data type.
- ☒ It can have elements of different data types.
- ☐ It is used exclusively for text processing.

### 38 Question 38

What is the purpose of NumPy's **np.arange()** function?

**Select the best alternative:**

- ☒ To create an array with evenly spaced values.
- ☐ To generate a random array.
- ☐ To create an array with a specified shape.
- ☐ To concatenate two arrays.

### 39 Question 39

What is the purpose of the **fit** method in scikit-learn models?

**Select the best alternative:**

- ☐ It transforms the input data
- ☒ It evaluates the model on the test data
- ☐ It trains the model on the input data
- ☐ It selects the most important features



## 40 Question 40

Given the following dataset, we want to use a simple neural network to classify values in the column Alignment. What should be the number of input and output neuron in your network?

\* Note the set of values in column Alignment is: {good, bad}

df:

Alignment	Intelligence	Strength	Speed	Durability	Power	Combat
good	50	31	43	32	25	52
good	38	100	17	80	17	64
good	88	14	35	42	35	85
good	50	90	53	64	84	65
bad	63	80	53	90	55	95

Select the best alternative:

- ☐ Input Neuron: 2; Output Neuron: 6
- ☐ Input Neuron: 6; Output Neuron: 1
- ☒ Input Neuron: 6; Output Neuron: 2
- ☐ Input Neuron: 1; Output Neuron: 6