1 **. How to copy by value a composite data type**

1. Using the spread (...) operator
2. Using the Object.assign() method
3. Using the JSON.stringify() and JSON.parse() methods

**>> Spread operator** allows an iterable to expand in places where 0+ arguments are expected. It is mostly used in the variable array where there is more than 1 values are expected. It allows us the privilege to obtain a list of parameters from an array

**Program**

var a=[1,2,3]

undefined

var c=[...a]

undefined

console.log(a,c)

VM377:1 (3) [1, 2, 3] (3) [1, 2, 3]

undefined

c[1]=10

10

console.log(a,c)

VM412:1 (3) [1, 2, 3] (3) [1, 10, 3]

copied variable value is changed but original variable value remain same.

**Object.assign()** method copies all enumerable own properties from one or more source objects to a target object. It returns the target object

**Program**

**var a=[1,2,3]**

**var b=Object.assign([],a)**

**undefined**

**console.log(a,b)**

**b[1]=50**

**50**

**console.log(a,b)**

**[1, 2, 3]0: 11: 22: 3length: 3\_\_proto\_\_: Array(0) (3) [1, 50, 3]**

**Undefined**

**Using JSON.parse() and JSON.stringify()**

The JSON object, available in all modern browsers, has two useful methods to deal with JSON-formatted content: parse and stringify. JSON.parse() takes a JSON string and transforms it into a JavaScript object. JSON.stringify() takes a JavaScript object and transforms it into a JSON string.Using JSON.parse() and JSON.stringify() for copy performs deep copy .

**Program**

* + var a=[1,2,3]
  + undefined
  + var b=JSON.parse(JSON.stringify(a))
  + undefined
  + console.log(a,b)
  + VM778:1 (3) [1, 2, 3] (3) [1, 2, 3]
  + undefined
  + b[1]=55
  + 55
  + console.log(a,b)
  + VM816:1 (3) [1, 2, 3] (3) [1, 55, 3]
  + undefined

The deep copy is a true copy for nested objects

**2.Copy by value and Copy by reference**

Copy by value the data which variable hold is passed to another variable . Both the variables refers two different memory locations.

**Program**

var a=10

undefined

var b=a

undefined

console.log(a,b)

VM896:1 10 10

Undefined

**Copy by reference** *For composite data types objects are copied by reference. Actual variable and copied variable both refer to same memory location . So change in data of copied variable will lead to change in data of original variable .*

**Program**

var a=[1,2,3]

undefined

var b=a

undefined

console.log(a,b)

VM960:1 (3) [1, 2, 3] (3) [1, 2, 3]

undefined

b[1]=55

55

console.log(a,b)

VM990:1 (3) [1, 55, 3] (3) [1, 55, 3]

Undefined

***Output of all countries***

​ Afghanistan

​ Åland Islands

​ Albania

​ Algeria

​ American Samoa

​ Andorra

​ Angola

​ Anguilla

​ Antarctica

​ Antigua and Barbuda

​ Argentina

​ Armenia

​ Aruba

​ Australia

​ Austria

​ Azerbaijan

​ Bahamas

​ Bahrain

​ Bangladesh

​ Barbados

​ Belarus

​ Belgium

​ Belize

​ Benin

​ Bermuda

​ Bhutan

​ Bolivia (Plurinational State of)

​ Bonaire, Sint Eustatius and Saba

​ Bosnia and Herzegovina

​ Botswana

​ Bouvet Island

​ Brazil

​ British Indian Ocean Territory

​ United States Minor Outlying Islands

​ Virgin Islands (British)

​ Virgin Islands (U.S.)

​ Brunei Darussalam

​ Bulgaria

​ Burkina Faso

​ Burundi

​ Cambodia

​ Cameroon

​ Canada

​ Cabo Verde

​ Cayman Islands

​ Central African Republic

​ Chad

​ Chile

​ China

​ Christmas Island

​ Cocos (Keeling) Islands

​ Colombia

​ Comoros

​ Congo

​ Congo (Democratic Republic of the)

​ Cook Islands

​ Costa Rica

​ Croatia

​ Cuba

​ Curaçao

​ Cyprus

​ Czech Republic

​ Denmark

​ Djibouti

​ Dominica

​ Dominican Republic

​ Ecuador

​ Egypt

​ El Salvador

​ Equatorial Guinea

​ Eritrea

​ Estonia

​ Ethiopia

​ Falkland Islands (Malvinas)

​ Faroe Islands

​ Fiji

​ Finland

​ France

​ French Guiana

​ French Polynesia

​ French Southern Territories

​ Gabon

​ Gambia

​ Georgia

​ Germany

​ Ghana

​ Gibraltar

​ Greece

​ Greenland

​ Grenada

​ Guadeloupe

​ Guam

​ Guatemala

​ Guernsey

​ Guinea

​ Guinea-Bissau

​ Guyana

​ Haiti

​ Heard Island and McDonald Islands

​ Holy See

​ Honduras

​ Hong Kong

​ Hungary

​ Iceland

​ India

​ Indonesia

​ Côte d'Ivoire

​ Iran (Islamic Republic of)

​ Iraq

​ Ireland

​ Isle of Man

​ Israel

​ Italy

​ Jamaica

​ Japan

​ Jersey

​ Jordan

​ Kazakhstan

​ Kenya

​ Kiribati

​ Kuwait

​ Kyrgyzstan

​ Lao People's Democratic Republic

​ Latvia

​ Lebanon

​ Lesotho

​ Liberia

​ Libya

​ Liechtenstein

​ Lithuania

​ Luxembourg

​ Macao

​ Macedonia (the former Yugoslav Republic of)

​ Madagascar

​ Malawi

​ Malaysia

​ Maldives

​ Mali

​ Malta

​ Marshall Islands

​ Martinique

​ Mauritania

​ Mauritius

​ Mayotte

​ Mexico

​ Micronesia (Federated States of)

​ Moldova (Republic of)

​ Monaco

​ Mongolia

​ Montenegro

​ Montserrat

​ Morocco

​ Mozambique

​ Myanmar

​ Namibia

​ Nauru

​ Nepal

​ Netherlands

​ New Caledonia

​ New Zealand

​ Nicaragua

​ Niger

​ Nigeria

​ Niue

​ Norfolk Island

​ Korea (Democratic People's Republic of)

​ Northern Mariana Islands

​ Norway

​ Oman

​ Pakistan

​ Palau

​ Palestine, State of

​ Panama

​ Papua New Guinea

​ Paraguay

​ Peru

​ Philippines

​ Pitcairn

​ Poland

​ Portugal

​ Puerto Rico

​ Qatar

script.js:7 Republic of Kosovo

script.js:7 Réunion

script.js:7 Romania

script.js:7 Russian Federation

script.js:7 Rwanda

script.js:7 Saint Barthélemy

script.js:7 Saint Helena, Ascension and Tristan da Cunha

script.js:7 Saint Kitts and Nevis

script.js:7 Saint Lucia

script.js:7 Saint Martin (French part)

script.js:7 Saint Pierre and Miquelon

script.js:7 Saint Vincent and the Grenadines

script.js:7 Samoa

script.js:7 San Marino

script.js:7 Sao Tome and Principe

script.js:7 Saudi Arabia

script.js:7 Senegal

script.js:7 Serbia

script.js:7 Seychelles

script.js:7 Sierra Leone

script.js:7 Singapore

script.js:7 Sint Maarten (Dutch part)

script.js:7 Slovakia

script.js:7 Slovenia

script.js:7 Solomon Islands

script.js:7 Somalia

script.js:7 South Africa

script.js:7 South Georgia and the South Sandwich Islands

script.js:7 Korea (Republic of)

script.js:7 South Sudan

script.js:7 Spain

script.js:7 Sri Lanka

script.js:7 Sudan

script.js:7 Suriname

script.js:7 Svalbard and Jan Mayen

script.js:7 Swaziland

script.js:7 Sweden

script.js:7 Switzerland

script.js:7 Syrian Arab Republic

script.js:7 Taiwan

script.js:7 Tajikistan

script.js:7 Tanzania, United Republic of

script.js:7 Thailand

script.js:7 Timor-Leste

script.js:7 Togo

script.js:7 Tokelau

script.js:7 Tonga

script.js:7 Trinidad and Tobago

script.js:7 Tunisia

script.js:7 Turkey

script.js:7 Turkmenistan

script.js:7 Turks and Caicos Islands

script.js:7 Tuvalu

script.js:7 Uganda

script.js:7 Ukraine

script.js:7 United Arab Emirates

script.js:7 United Kingdom of Great Britain and Northern Ireland

script.js:7 United States of America

script.js:7 Uruguay

script.js:7 Uzbekistan

script.js:7 Vanuatu

script.js:7 Venezuela (Bolivarian Republic of)

script.js:7 Viet Nam

script.js:7 Wallis and Futuna

script.js:7 Western Sahara

script.js:7 Yemen

script.js:7 Zambia

script.js:7 Zimbabwe