

ITCS473 Project Assignment 2 Testing for Agile Software Project

Unit Testing

Test Suite 1: testHandleAddToCart – ISP Interface-based ECC

Goal: Test the functionality of adding an item to the cart

1. Identify testable functions
 - Testable function: handleAddToCart()
2. Identify parameters, return types, return values, and exceptional behavior
 - Parameters:
 - product: Product | null,
 - selectedAddOns: AddOn[],
 - quantity: number,
 - displayTotalPrice: number,
 - addToCart: (item: CartItemType) => number, // returns cart length or updated cart
 - category = ""
 - sweetness = ""
 - type = ""
 - Return type: object
 - Return value:
 - { success: false, message: "Product not found" } if the product is null
 - { success: true, cartLength: number } if adding a product to the cart succeeds, where cartLength represents the updated cart size.
 - Exceptional behavior:
 - If the product to be added to the cart is null, it will return { success: false, message: "Product not found" }
 - If the quantity of the product to be added to the cart is invalid (0 or negative), it will return { success: false, message: "Product quantity is invalid" }
 - If the total price of the product to be added to the cart is invalid (0 or negative), it will return { success: false, message: "Product total price is invalid" }
3. Model the input domain
 - Develop characteristics
 - C1: The product is null
 - C2: The selectedAddOns are empty
 - C3: The value of quantity
 - C4: The value of displayTotalPrice
 - C5: The category is empty
 - C6: The sweetness is empty

- C7: The type is empty

- Partition characteristic

Characteristic	b1	b2	b3
C1: The product is null	True	False	
C2: The selectedAddOns are empty	True	False	
C3: The value of quantity	Quantity <= 0	Quantity > 0	Quantity is not a number
C4: The value of displayTotalPrice	displayTotalPrice <= 0	displayTotalPrice > 0	displayTotalPrice is not a number
C5: The category is empty	True	False	
C6: The sweetness is empty	True	False	
C7: The type is empty	True	False	

- Identify (possible) value

Characteristic	b1	b2	b3
C1: The product is null	null	product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"]},	

		isRecommended: true, img_src: "/images/americano. png", category: "Beverage", AddOns: [{ name: "Oat Milk", price: 10 }], };	
C2: The selectedAddOns are empty	[{}]	[[name: "Oat Milk", price: 10]]	
C3: The value of quantity	0	1	NaN
C4: The value of displayTotalPrice	0	60	NaN
C5: The category is empty	""	"Beverage"	
C6: The sweetness is empty	""	"50%"	
C7: The type is empty	""	"Hot"	
4. Combine partitions to define test requirements <ul style="list-style-type: none"> • BCC Approach <ul style="list-style-type: none"> ○ Test requirements: ○ Base choice = (C1b2, C2b2, C3b2, C4b2, C5b2, C6b2, C7b2) ○ Number of tests = $1 + [(2-1) + (2-1) + (3-1) + (3-1) + (2-1) + (2-1) + (2-1)] = 10$ T1 (C1b2, C2b2, C3b2, C4b2, C5b2, C6b2, C7b2) product = { id: 101,			

```

    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    AddOns: [{ name: "Oat Milk", price: 10 }],
  };
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = 60;
  sweetness = "50%";
  type = "Hot";

```

T2 (**C1b1**, C2b2, C3b2, C4b2, C5b2, C6b2, C7b2)

```

  product = null; -> Doesn't have category -> Infeasible
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = 60;
  sweetness = "50%";
  type = "Hot";

```

T3 (C1b2, **C2b1**, C3b2, C4b2, C5b2, C6b2, C7b2)

```

  product = {
    id: 101,
    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    AddOns: [],
  };
  selectedAddOns = [];
  quantity = 1;
  displayTotalPrice = 60;
  sweetness = "50%";
  type = "Hot";

```

T4 (C1b2, C2b2, **C3b1**, C4b2, C5b2, C6b2, C7b2)

```
product = {
  id: 101,
  Drink_Name: "Americano",
  Description: "A rich espresso with added water for a smooth coffee.",
  Price: { hotPrice: 50, coldPrice: 55 },
  DrinkType: "Hot/Cold",
  Tag: ["Coffee"],
  isRecommended: true,
  img_src: "/images/americano.png",
  category: "Beverage",
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
};
selectedAddOns = [{ name: "Oat Milk", price: 10 }];
quantity = 0;
displayTotalPrice = 60;
sweetness = "50%";
type = "Hot";
```

T5 (C1b2, C2b2, **C3b3**, C4b2, C5b2, C6b2, C7b2)

```
product = {
  id: 101,
  Drink_Name: "Americano",
  Description: "A rich espresso with added water for a smooth coffee.",
  Price: { hotPrice: 50, coldPrice: 55 },
  DrinkType: "Hot/Cold",
  Tag: ["Coffee"],
  isRecommended: true,
  img_src: "/images/americano.png",
  category: "Beverage",
  AddOns: [],
};
selectedAddOns = [{ name: "Oat Milk", price: 10 }];
quantity = NaN;
displayTotalPrice = 60;
sweetness = "50%";
type = "Hot";
```

T6 (C1b2, C2b2, C3b2, **C4b1**, C5b2, C6b2, C7b2)

```
product = {
  id: 101,
  Drink_Name: "Americano",
```

```

    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  };
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = -1;
  sweetness = "50%";
  type = "Hot";

```

T7 (C1b2, C2b2, C3b2, **C4b3**, C5b2, C6b2, C7b2)

```

  product = {
    id: 101,
    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  };
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = NaN;
  sweetness = "50%";
  type = "Hot";

```

T8 (C1b2, C2b2, C3b2, C4b2, **C5b1**, C6b2, C7b2)

```

  product = {
    id: 101,
    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],

```

```

    isRecommended: true,
    img_src: "/images/americano.png",
    category: "",
    selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  };
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = 60;
  sweetness = "50%";
  type = "Hot";

```

T9 (C1b2, C2b2, C3b2, C4b2, C5b2, **C6b1**, C7b2)

```

  product = {
    id: 101,
    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  };
  selectedAddOns = [{ name: "Oat Milk", price: 10 }];
  quantity = 1;
  displayTotalPrice = 60;
  sweetness = "";
  type = "Hot";

```

T10 (C1b2, C2b2, C3b2, C4b2, C5b2, C6b2, **C7b1**)

```

  product = {
    id: 101,
    Drink_Name: "Americano",
    Description: "A rich espresso with added water for a smooth coffee.",
    Price: { hotPrice: 50, coldPrice: 55 },
    DrinkType: "Hot/Cold",
    Tag: ["Coffee"],
    isRecommended: true,
    img_src: "/images/americano.png",
    category: "Beverage",
    AddOns: [{ name: "Oat Milk", price: 10 }],
  };

```

```

    };
    selectedAddOns = [{ name: "Oat Milk", price: 10 }];
    quantity = 1;
    displayTotalPrice = 60;
    sweetness = "50%";
    type = "";

```

5. Derive test value:

Test Case	Test Value	Expected result
T1 (C1b2, C2b2, C3b2, C4b2, C5b2, C6b2, C7b2)	<pre> product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", AddOns: [{ name: "Oat Milk", price: 10 }], }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = 60; sweetness = "50%"; type = "Hot"; </pre>	{ success: true, cartLength: 1 }
T2 (C1b2, C2b1 , C3b2, C4b2, C5b2, C6b2, C7b2)	<pre> product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for </pre>	{ success: true, cartLength: 1 }

	a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", AddOns: [], }; selectedAddOns = []; quantity = 1; displayTotalPrice = 60; sweetness = "50%"; type = "Hot";	
T3 (C1b2, C2b2, C3b1 , C4b2, C5b2, C6b2, C7b2)	product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", selectedAddOns = [{ name: "Oat Milk", price: 10 }]; }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 0; displayTotalPrice = 60; sweetness = "50%"; type = "Hot";	{ success: false, message: "Product quantity is invalid" }

T4 (C1b2, C2b2, C3b3 , C4b2, C5b2, C6b2, C7b2)	<pre> product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", AddOns: [], }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = NaN; displayTotalPrice = 60; sweetness = "50%"; type = "Hot"; </pre>	{ success: false, message: "Product quantity is invalid" }
T5 (C1b2, C2b2, C3b2, C4b1 , C5b2, C6b2, C7b2)	<pre> product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", selectedAddOns = [{ name: </pre>	{ success: false, message: "Product total price is invalid"}

	"Oat Milk", price: 10 }]; }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = -1; sweetness = "50%"; type = "Hot";	
T6 (C1b2, C2b2, C3b2, C4b3 , C5b2, C6b2, C7b2)	product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", selectedAddOns = [{ name: "Oat Milk", price: 10 }]; }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = NaN; sweetness = "50%"; type = "Hot";	{ success: false, message: "Product total price is invalid"}
T7(C1b2, C2b2, C3b2, C4b2, C5b1 , C6b2, C7b2)	product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 },	{ success: false, message: "Product category is invalid"}

	DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "", selectedAddOns = [{ name: "Oat Milk", price: 10 }]; }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = 60; sweetness = "50%"; type = "Hot";	
T8 (C1b2, C2b2, C3b2, C4b2, C5b2, C6b1 , C7b2)	product = { id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", selectedAddOns = [{ name: "Oat Milk", price: 10 }]; }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = 60; sweetness = ""; type = "Hot";	{ success: false, message: "Product sweetness or type is invalid"}
T9 (C1b2, C2b2,	product = {	{ success: false,

C3b2, C4b2, C5b2, C6b2, C7b1)	id: 101, Drink_Name: "Americano", Description: "A rich espresso with added water for a smooth coffee.", Price: { hotPrice: 50, coldPrice: 55 }, DrinkType: "Hot/Cold", Tag: ["Coffee"], isRecommended: true, img_src: "/images/americano.png", category: "Beverage", AddOns: [{ name: "Oat Milk", price: 10 }], }; selectedAddOns = [{ name: "Oat Milk", price: 10 }]; quantity = 1; displayTotalPrice = 60; sweetness = "50%"; type = "";	message: "Product sweetness or type is invalid"
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Test Suite 2: testHandleSortChange – ISP Interface-based ECC

Goal: Test the functionality of searching for an item

1. Identify testable functions
 - Testable function: handleSortChange ()
2. Identify parameters, return types, return values, and exceptional behavior
 - Parameters: Product[] updatedProducts, String sortOrder
 - Return type: Product[]
 - Return value: updatedProducts unsorted or sorted by price in ascending or descending.
 - Exceptional behavior:
3. Model the input domain
 - Develop characteristics
 - C1: length of updatedProducts array
 - C2: sortOrder value
 - C3 = hotPrice value
 - C4 = coldPrice value
 - Partition characteristic

Characteristic	b1	b2	b3
C1 = length of updatedProducts	Empty	Single Product	Multiple Products
C2 = sortOrder value	Ascending	Descending	Invalid value
C3 = hotPrice value	Valid	Invalid	
C4 = coldPrice value	Valid	Invalid	

- Identify (possible) value

Characteristic	b1	b2	b3
C1 = length of updatedProducts	[]	{ id: 1, name: "Dirty", description: "A rich espresso shot served over	{ id: 1, name: "Dirty", description: "A rich espresso shot served over

		cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended : true, image: "latte.png", Tag: ["Coffee", "Reco mmend"]}]	cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended : true, image: "latte.png", Tag: ["Coffee", "Reco mmend"]}], { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended : false, image: "americano.png" , Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and
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			steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}]}
C2 = sortOrder value	"Price Low to High"	"Price High to Low"	"Invalid value"
C3 = hotPrice value	50	-	
C4 = coldPrice value	60	-	

4. Combine partitions to define test requirements

- BCC Approach

- Base choice: C1b3, C2b1, C3b1, C4b1
- Test requirements:
- Number of tests = 7

(C1b3, C2b1, C3b1, C4b1) = handleSortChange ([{ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}], "Price Low to High")

(C1b3, C2b1, C3b1, C4b2) = handleSortChange ([{ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor


```
contrast.", hotPrice: "85", coldPrice: "-", category: "Drink", TypeOfDrinks:
"Hot/Cold", isRecommended: true, image: "latte.png", Tag:
["Coffee", "Recommend"]},
{ id: 2, name: "Americano", description: "An Americano is made by diluting an
espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55",
coldPrice: "-", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended:
false, image: "americano.png", Tag: ["Coffee"]},
{ id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk
with a creamy finish.", hotPrice: "60", coldPrice: "-", category: "Drink",
TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag:
["Coffee", "Milk"]}], "Price Low to High")
```

```
(C1b3, C2b1, C3b2, C4b1) = handleSortChange ({ id: 1, name: "Dirty",
description: "A rich espresso shot served over cold milk, resulting in a bold flavor
contrast.", hotPrice: "-", coldPrice: "90", category: "Drink", TypeOfDrinks:
"Hot/Cold", isRecommended: true, image: "latte.png", Tag:
["Coffee", "Recommend"]},
{ id: 2, name: "Americano", description: "An Americano is made by diluting an
espresso shot with hot water for a smooth, robust coffee.", hotPrice: "-",
coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended:
false, image: "americano.png", Tag: ["Coffee"]},
{ id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk
with a creamy finish.", hotPrice: "-", coldPrice: "65", category: "Drink",
TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag:
["Coffee", "Milk"]}], "Price Low to High")
```

```
(C1b3, C2b2, C3b1, C4b1) = handleSortChange ({ id: 1, name: "Dirty",
description: "A rich espresso shot served over cold milk, resulting in a bold flavor
contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks:
"Hot/Cold", isRecommended: true, image: "latte.png", Tag:
["Coffee", "Recommend"]},
{ id: 2, name: "Americano", description: "An Americano is made by diluting an
espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55",
coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended:
false, image: "americano.png", Tag: ["Coffee"]},
{ id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk
with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink",
TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag:
["Coffee", "Milk"]}], "Price High to Low")
```

```
(C1b3, C2b3, C3b1, C4b1) = handleSortChange ({ id: 1, name: "Dirty",
description: "A rich espresso shot served over cold milk, resulting in a bold flavor
```

```
contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks:
"Hot/Cold", isRecommended: true, image: "latte.png", Tag:
["Coffee", "Recommend"]}},
{ id: 2, name: "Americano", description: "An Americano is made by diluting an
espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55",
coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended:
false, image: "americano.png", Tag: ["Coffee"]},
{ id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk
with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink",
TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag:
["Coffee", "Milk"]}}, "Invalid value")
```

(C1b1, C2b1, C3b1, C4b1) = Infeasible

```
(C1b2, C2b1, C3b1, C4b1) = handleSortChange ({ id: 1, name: "Dirty",
description: "A rich espresso shot served over cold milk, resulting in a bold flavor
contrast.", hotPrice: "50", coldPrice: "60", category: "Drink", TypeOfDrinks:
"Hot/Cold", isRecommended: true, image: "latte.png", Tag:
["Coffee", "Recommend"]}}, "Price Low to High")
```

5. Derive test value:

Test Case	Test Value	Expected result
T1 (C1b3, C2b1, C3b1, C4b1)	handleSortChange ({ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold",	[{ id: 2, ... }, { id: 3, ... }, { id: 1, ... }]

	isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}], "Price Low to High")	
T2 (C1b3, C2b1, C3b1, C4b2)	handleSortChange ([{ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "-", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "-", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "-", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}], "Price Low to High")	[{ id: 2, ... }, { id: 3, ... }, { id: 1, ... }]

T3 (C1b3, C2b1, C3b2, C4b1)	<p>handleSortChange ({ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "-", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "-", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "-", coldPrice: "65", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}, "Price Low to High")</p>	[{ id: 2, ... }, { id: 3, ... }, { id: 1, ... }]
T4 (C1b3, C2b2, C3b1, C4b1)	<p>handleSortChange ({ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made</p>	[{ id: 1, ... }, { id: 3, ... }, { id: 2, ... }]

	<p>by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}], "Price High to Low")</p>	
T5 (C1b3, C2b3, C3b1, C4b1)	<p>handleSortChange ([{ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "85", coldPrice: "90", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, { id: 2, name: "Americano", description: "An Americano is made by diluting an espresso shot with hot water for a smooth, robust coffee.", hotPrice: "55", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "americano.png", Tag: ["Coffee"]}, { id: 3, name: "Latte", description: "A smooth blend of espresso and steamed milk with a creamy finish.", hotPrice: "60", coldPrice: "65", category: "Drink",</p>	[{ id: 1, ... }, { id: 2, ... }, { id: 3, ... }]

	TypeOfDrinks: "Hot/Cold", isRecommended: false, image: "latte.png", Tag: ["Coffee", "Milk"]}, "Invalid value")	
T6 (C1b2, C2b3, C3b1, C4b1)	handleSortChange ({ id: 1, name: "Dirty", description: "A rich espresso shot served over cold milk, resulting in a bold flavor contrast.", hotPrice: "50", coldPrice: "60", category: "Drink", TypeOfDrinks: "Hot/Cold", isRecommended: true, image: "latte.png", Tag: ["Coffee", "Recommend"]}, "Price Low to High")	[{ id: 1, ... }]

Test Suite 3: testHandleAddOnClick – ISP Functionality-based ACoC

Goal: Test the functionality of toggling the selection state of an add-on in the selected AddOns

Identify testable functions

- Testable function: handleAddOnClick()

Identify parameters, return types, return values, and exceptional behavior

- Parameters:
 - selectedAddOn: AddOn, // new add-on
 - selectedAddOns: AddOn[] // array of current selected add-ons
- Return type: array
- Return value:
 - If the add-on is already selected (exists in the list), it removes it from the selectedAddOns and returns the new list of selectedAddOns.
 - If the add-on is not already selected, it adds it to the selectedAddOns and returns the new list of selectedAddOns.
- Exceptional behavior: -

Model the input domain

- Develop characteristics
 - C1: The initial state of the selectedAddOns list is initially empty.
 - C2: The selectedAddOn already exists in the selectedAddOns list
- Partition characteristic

Characteristic	b1	b2
C1 = The initial state of selectedAddOns list is initially empty	True	False
C2 = The selectedAddOn already exists in the selectedAddOns list	True	False

- Identify (possible) value

Characteristic	b1	b2
C1 = The initial state of selectedAddOns list is initially	selectedAddOns = []	selectedAddOns = [{ name: "Oat Milk",

empty		price: 15 }}
C2 = The selectedAddOn already exists in the selectedAddOns list	selectedAddOn = { name: "Oat Milk", price: 15 } selectedAddOns = [{ name: "Oat Milk", price: 15 }]	selectedAddOn = { name: "Brown Sugar Jelly", price: 15 } selectedAddOns = [{ name: "Oat Milk", price: 15 }]

Combine partitions to define test requirements

- ACoC Approach
 - Test requirements:
 - Number of tests = $2 \times 2 = 4$

(C1b1, C2b1) = **Infeasible**

(C1b1, C2b2) =

selectedAddOn = { name: "Oat Milk", price: 15 }
selectedAddOns = [];

(C1b2, C2b1) =

selectedAddOn = { name: "Oat Milk", price: 15 }
selectedAddOns = [{ name: "Oat Milk", price: 15 }]

(C1b2, C2b2) =

selectedAddOn = { name: "Brown Sugar Jelly", price: 15 }
selectedAddOns = [{ name: "Oat Milk", price: 15 }]

Derive test value:

Test Case	Test Value	Expected result
T2 (C1b1, C2b2)	selectedAddOn = { name: "Oat Milk", price: 15 } selectedAddOns = [];	[{ name: "Oat Milk", price: 15 }]
T3 (C1b2, C2b1)	selectedAddOn = { name: "Oat Milk", price: 15 } selectedAddOns = [{ name: "Oat Milk", price: 15 }]	[] (Remove the add-on from the list)
T4 (C1b2, C2b2)	selectedAddOn = { name: "Brown Sugar Jelly", price: 15 } }	[{ name: "Oat Milk", price: 15 }, { name: "Brown Sugar Jelly",

	selectedAddOns = [{ name: "Oat Milk", price: 15 }]	price: 15 }
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