1. React functional component lifecycle: mounting > updating > unmounting
   1. Only called when component is mounted:   
      useEffect(() {  
      // logic  
      }, [])
   2. Only called when component is mounted and updated:   
      useEffect(() {  
      // logic  
      })
   3. Called when component is mounted and unmounted (return statement):   
      useEffect(() {  
      // logic  
      return() => {  
      // logic  
      }  
      }, [])
2. **Controlled vs uncontrolled components**
   1. A [Controlled Component](https://facebook.github.io/react/docs/forms.html#controlled-components) is one that takes its current value through props and notifies changes through callbacks like onChange. A parent component "controls" it by handling the callback and managing its own state and passing the new values as props to the controlled component. You could also call this a "dumb component". They don’t maintain state internally. It is managed via some events.
   2. A [Uncontrolled Component](https://facebook.github.io/react/docs/uncontrolled-components.html) is one that stores its own state internally, and you query the DOM using a ref to find its current value when you need it. This is a bit more like traditional HTML.
3. Lexical Scoping – Refers to the scoping in which inner functions can access variables from parent function until global context. The vice-versa is not possible
4. **Lexical** – this word refers to where the function is declared and not called
5. **Attribute vs Property** – <https://codesandbox.io/s/amazing-chandrasekhar-io5m24?file=/src/index.js>
   1. **Attribute**: initial state of the HTML tag rendered in DOM
   2. **Property** – current state of the HTML tag.
6. **Props vs state**
   1. **Props** get passed to the component similar to function parameters
   2. **State** is managed within the component similar to variables declared within a function
7. **Phases of reactJS lifecycle**
   1. **Initialization:** In this phase react component prepares setting up the initial state and default props.
   2. **Mounting:** The react component is ready to mount in the browser DOM. This phase covers **componentWillMount** and **componentDidMount** lifecycle methods.
   3. **Updating:** In this phase, the component get updated in two ways, sending the new props and updating the state. This phase covers **shouldComponentUpdate, componentWillUpdate and componentDidUpdate** lifecycle methods.
   4. **Unmounting:** In this last phase, the component is not needed and get unmounted from the browser DOM. This phase include **componentWillUnmount** lifecycle method.
8. **React Portal** - They comes in handy when we need to render child components outside the normal DOM hierarchy without breaking the event propagation's default behaviour through the React component tree hierarchy. This is useful when rendering components such as modals/dialogs, tooltips, popup messages, and so much more. <https://blog.bitsrc.io/understanding-react-portals-ab79827732c7>
9. **Lifecycle methods of react (Class based Components)**
   1. **componentWillMount:** Executed before rendering and is used for App level configuration in your root component.
   2. **componentDidMount:** Executed after first rendering and here all AJAX requests, DOM or state updates, and set up eventListeners should occur.
   3. **componentWillReceiveProps:** Executed when particular prop updates to trigger state transitions.
   4. **shouldComponentUpdate:** Determines if the component will be updated or not. By default it returns true. If you are sure that the component doesn't need to render after state or props are updated, you can return false value. It is a great place to improve performance as it allows you to prevent a rerender if component receives new prop.
   5. **componentWillUpdate:** Executed before re-rendering the component when there are pros & state changes confirmed by shouldComponentUpdate which returns true.
   6. **componentDidUpdate:** Mostly it is used to update the DOM in response to prop or state changes. Takes in two input parameters (**prevProps**, **prevState**)
   7. **componentWillUnmount:** It will be used to cancel any outgoing network requests, or remove all event listeners associated with the component.
10. DOM, Virtual DOM, Shadow DOM
    1. DOM: API for HTML and XML documents. Creates a logical structure which can be accessed and manipulated by browsers
    2. Virtual DOM: Creates copy of entire DOM and stores in memory. On change of component, it updates Virtual DOM. Virtual DOM is compared with DOM, if any changes they are reflected in DOM. To see in action > Go to Console > click 3 dots > Rendering > **Paint Flashing**
       1. <https://hackernoon.com/virtual-dom-reconciliation-and-diffing-algorithm-explained-simply-ycn34gr>
    3. Shadow DOM: Creates small pieces of DOM which has their own isolated scope for the element they represent. Eg: video tag is html. DOM doesn’t shows volume or play/pause button
11. When component renders
    1. When the state changes of component
    2. When the value of props which the component receives changes
    3. When parent re-renders, by default the child also renders
12. Memoization
    1. Speed optimization technique where given a functions, it returns the cached version of output for same inputs
    2. It remembers output for the given set of inputs
    3. It does a shallow comparison (reference check for non-primitive(object, arrays or functions) that memory location is still same or not) of props, if value changed, it re-renders
13. useMemo, memo and useCallback
    1. React.memo – similar to React.purecomponent() for class based components. It will compare all props passed to the component by referential equality. If these props are unchanged, React.memo will reuse the last rendered result, therefore, it prevents the component from being re-rendered.
    2. useMemo and useCallback: Both React.useMemo and React.useCallback receives a function as its first argument and a dependencies array as the second one. The hook will return a new value only when one of the dependencies value changes (referential equality). The main difference is that React.useMemo will call the function which is received and return its result while React.useCallback will return the received function without calling it.
    3. useMemo – memorizes the result of the function that is called. use React.useMemo when we compute expensive value that we don't want to compute it again and again when the component is rerendered
    4. useCallback – memorizes a function which can later be called
14. React vs Node Js: <https://www.geeksforgeeks.org/difference-between-node-js-and-react-js/>
15. Redux vs Context API : <https://dev.to/ruppysuppy/redux-vs-context-api-when-to-use-them-4k3p>
16. React Hooks :
    1. useState - useState is a Hook that lets you add React state to function components
    2. useEffect – single hook to take care of **componentDidMount and componentDidUpdate. R** **uns both after the first render and after every update**
    3. useReducer - To help separate the concerns (rendering and state management) React provides the hook useReducer(). The hook does so by extracting the state management out of the component.
    4. useRef -
    5. createContext – useContext  
         
       <https://youtu.be/o-alRbk_zP0>
    6. useCallback - Pass an inline callback and an array of dependencies. useCallback will return a memoized version of the callback that only changes if one of the dependencies has changed. This is useful when passing callbacks to optimized child components that rely on reference equality to prevent unnecessary renders
    7. useMemo - useMemo will only recompute the memoized value when one of the dependencies has changed. This optimization helps to avoid expensive calculations on every render.
    8. React.memo() - it does a shallow comparison. It works good with strings and numbers. Doesn’t works when passed in objects or functions (useCallback/useMemo helps) . It will compare all props passed to the component by referential equality. If these props are unchanged, React.memo will reuse the last rendered result, therefore, it prevents the
17. List in react - <https://www.javatpoint.com/react-lists>
18. Dynamic form - <https://www.freecodecamp.org/news/build-dynamic-forms-in-react/>
    1. <https://codesandbox.io/s/solitary-wave-m5foos?file=/src/App.js>
19. Higher order Component
20. React Routers – Browser, Memory, Hash (<https://learnwithparam.com/blog/different-types-of-router-in-react-router/>) <https://codesandbox.io/s/objective-nash-illdyn?file=/src/App.js>
21. React Pure Component – A React component is said to be pure if it renders the same output for the same state and props. For React **pure class components**, React provides the **PureComponent** base class. Class components that extend the React.PureComponent classes are treated as pure components. To create a pure functional component in React, React provides a React.memo() API. Using the React.memo() API, the React functional component can be wrapped as follows to get React Pure Functional Component.
22. <React.StrictMode/> - doesn’t impacts in the production code, only used in development mode
    1. Identifying components with unsafe lifecycles - when we are still using class based components and not using the lifecycle methods in correct order
    2. Warning about legacy string ref API usage
    3. Warning about deprecated findDOMNode usage
    4. Detecting unexpected side effects
    5. Detecting legacy context API
23. React Custom Hooks – Javascript function which starts with “use” keyword and can make use of inbuilt hooks. It is used for sharing the code.
24. Reconciliation: Reconciliation is the process through which React updates the Browser DOM. It uses virtual DOM approach. Refer to point 6
25. **Babel** - Babel is a transpiler i.e. it converts the JSX to vanilla JavaScript. You can view babel as an intermediate step between your code and "executable" code.
26. **Prop drilling** –
27. **React Flux Architecture -** [**https://www.freecodecamp.org/news/how-to-use-flux-in-react-example/**](https://www.freecodecamp.org/news/how-to-use-flux-in-react-example/)
    1. **View -**> Action -> Dispatcher -> Store/s -> (Back to view) Unidirectional Flow
28. **State lifting**
29. **Cache headers**
    1. **Expires – Date Obj**
    2. **Cache-control – multi value header (**
       1. **private (only in browser cache) ,**
       2. **public (browser as well as proxy server cache),**
       3. **no-store (no cache stored, always fetch from server),**
       4. **no cache (can be cached, but to reuse, it needs to be revalidated from server),**
       5. **max-age (cached only for a particular time) )**
30. **Increase performance of a website:**
    1. Caching & Content Delivery Networks
    2. Minimize HTTP Requests
    3. Reduce Redirects
    4. Enable compression of files – html, css, javascript
    5. Optimise Database - Get rid of all these garbage data and useless content
    6. Keep scripts at the bottom
    7. Optimize images – using image formats accordingly
    8. Reduce number of custom fonts
31. **Increase performance of a React Application:**
    1. Keeping component state local where necessary
    2. Memoizing React components to prevent unnecessary re-renders
    3. Code-splitting in React using dynamic import() – React.Lazy()
    4. Lazy loading images in React
    5. Windowing or list virtualization in React applications
32. Service Worker (https://www.youtube.com/watch?v=ksXwaWHCW6k)
    1. JS script which is registered with browser
    2. Virtual proxy between the browser and the network
    3. Stays registered even when there is no internet connection
    4. Load content even if offline
    5. They don’t have access to the DOM
    6. Works only in HTTPs
    7. Eg: Push notifications and notification API
    8. Register a service broker with navigator.serviceWorker.register (it is a promise)
    9. Major event listeners:
       1. **Install** - In the install listener, we can initialize the cache and add files to it for offline use
       2. **Activate** - This ensures we have only the files we need in the cache, so we don't leave any garbage behind; the available cache space in the browser is limited, so it is a good idea to clean up after ourselves.
       3. **Fetch -** fires every time an HTTP request is fired off from our app. Here, we respond to the fetch event with a function that tries to find the resource in the cache and return the response if it's there. If not, we use another fetch request to fetch it from the network, then store the response in the cache so it will be available there next time it is requested.
33. Infinite Scrolling (Used to more user interactive applications – Facebook, instagram)
    1. Pros
       1. More user engagement -
       2. Better User experience – especially for mobile devices
       3. Faster than clicking – less number of user clicks
    2. Cons
       1. More loading speed
       2. Unable to bookmark
       3. No footers
34. Pagination (Used for e-commerce applications – Amazon, flipkart, aliexpress)
    1. Pros
       1. More user control
       2. Scanning of item is much better than infinite scroll
    2. Cons
       1. More user clicks
       2. Limited content
35. Lazy loading – identify resource which are non-critical and load only when needed. Load only the critical resource which loads when the page is visited for the first time
    1. Lazily load images and videos
36. Event bubbling – Event propagation happens in bottom-up approach. The process in which the lowest element is executed first and it goes upto the body.
37. Event capturing/event trickling – Event propagation happens in top-down approach. reverse of event bubbling. This is the first phase
38. Event delegation - instead of assigning a handler to each of them – we put a single handler on their common ancestor or parent to delegate the child events
39. Webpack, webpack-dev-server
40. PWA – Progressive Web Apps (https://web.dev/pwa-checklist/)
    1. Completely HTML5 based website meant for offline support which supports in all browsers
    2. Make use of service workers for cache support and interact with server
    3. Use web workers for background processing
    4. Low file size compared to application
41. Redux Thunk
42. Redux Saga
43. Secure a Website –
    1. Install security plugins. Eg – sitelock, ithemes security
    2. Use HTTPS instead of HTTP – S means usage of SSL certifiacate (encrypts the request to/from a server).
    3. Update your website regularly to avoid security issues
    4. Use secure passwords . Mix of characters and a long password
    5. Use automatic/manual back-up of your website to restore the last latest content
44. Check for cross browser issues
    1. Check for javascript functions which are compatible with older browsers and different versions
    2. Check online tools like – caniuse
    3. Use transpiling using babel
    4. Test the functionality on real devices
    5. Use polyfills
    6. Use respective browser debugger tools for further analysis
45. SSO/SAML Flow: Mainly 3 parties involved – User, Service Provider, Identity Provider
    1. User requests page to server
    2. Server authenticates the user by forming a SAML request and sending it to Identity provider
    3. IP generates a SAML token and sends it back to browser.
    4. Browsers send SAML token to server to validate the user.
    5. Server validates the token and if everything is good, server goes ahead and display the webpage to user
    6. There is a validity for the token. Say 1 hour. In that 1 hour, user need not to do the entire process again.
    7. This is SSO flow
46. Micro frontend - <https://single-spa.js.org/docs/microfrontends-concept>
    1. Easier to test
    2. Easier to develop and deploy – separate CI/CD
    3. No shared code
    4. Can change architecture of one without touching another
    5. Implement micro-frontend
       1. <https://medium.com/bb-tutorials-and-thoughts/how-to-implement-micro-frontend-architecture-with-react-5ab172a0fec7>
47. Cache vs Cookie – <https://www.tutorialspoint.com/difference-between-cache-and-cookies>
    1. Cookie is used to store information to track different characteristics related to user, while cache is used to make the loading of web pages faster.
    2. Cookies stores information such as user preferences, while cache will keep resource files such as audio, video or flash files.
    3. cookies expire after some time, but cache is kept in the client’s machine until they are removed manually by the user.
48. Synthetic Events
    1. A wrapper which registers all the different names of same event
    2. It gives cross browser functionality and makes sure that react applications are working across browsers
    3. React uses the event object to improve the performance
49. Semantic elements
    1. Tags which clearly tell the meaning – form, table, article, header, footer etc
    2. Straightforward to understand and modify
    3. Improves accessibility
50. Block, inline, inline-block
    1. Block – take the entire width of the page , always start in a new line. Eg - Div
    2. Inline – only occupy the width of the content, starts in the same line. It doesn’t takes height and width properties. Eg – span tag
    3. Inline-block - use inline elements and adjust the height and width
51. Progressive Hydration
52. ReactDOM.renderToString – Render bunch of components one at a time and produces string as a resulting HTML
53. ReactDOM.hydrate - hydrate() is used when we want to render our React Application on server side and hydrate the JavaScript bundle on the client side which make our application fast and also allow the search engines to crawl your pages for SEO purposes
54. oAuth 2.0
55. Fetch Timeout after certain seconds - <https://codesandbox.io/s/fetch-timeout-yi7u3f>
    1. <https://javascript.plainenglish.io/how-to-set-api-timeout-with-javascript-fetch-api-2d7c95782fa9>
56. React callback way - <https://codesandbox.io/s/quirky-elion-ik9ifp?file=/src/App.js>
57. web worker – offload the work in a separate thread
    1. used to compute expensive computations
    2. helps to free up the main thread
58. StopWatch - React
    1. <https://codesandbox.io/s/stopwatch-js-syzerq?file=/index.html> - using only JS
    2. <https://codesandbox.io/s/modest-sea-3ddc92?file=/src/App.js> React
59. React Lazy – lets you render a dynamic import as a regular component.
    1. <https://codesandbox.io/s/react-lazy-gumcwg?file=/src/index.js>
60. Toast Message - <https://codesandbox.io/s/cranky-browser-xclovw?file=/src/App.js:825-1157>
61. Why is key needed when iterating over list and creating components:  
    Keys help react identify which elements have changed, have been deleted or added. It gives the elements in the array a stable identity
62. Preload vs Prefetch
    1. **Preloaded** chunks will be loaded with higher priority in parallel to its parent chunk. Mark chunks to be preloaded only if you are confident that the user will interact with them immediately. This can be a dropdown or the contents of a tab.
    2. **Prefetched** chunks have lower priority and will be loaded in the browser’s idle time. In other words, mark chunks to be prefetched if the user may need them at some point. This can be the next page he is most likely to visit. He won’t request it immediately but you want it to be there when he does.
63. <https://www.codementor.io/@adititipnis/javascript-how-to-make-api-calls-for-each-value-in-an-array-and-get-an-array-of-results-v1sfcj11o>
64. Code Splitting - <https://hackernoon.com/lessons-learned-code-splitting-with-webpack-and-react-f012a989113>
65. React createElement - <https://codesandbox.io/s/sleepy-fire-il0gv0?file=/src/App.js>
66. React questions: <https://www.freecodecamp.org/news/react-interview-questions-to-know/>
67. **React vs ReactDOM**: As the name implies, ReactDOM is the glue between React and the DOM. For   
    everything else, there’s React. You use React to define and create your elements, for lifecycle hooks, etc. i.e. the guts of a React application.
    1. **React**: a javascript library, designed for building user interfaces
    2. **React-DOM**: a complimentary library to React which glues React to the browser DOM
68. Array of API in synchronous way - <https://jsfiddle.net/u5ozyj9c/84/>
69. Auto complete - <https://codesandbox.io/s/auto-complete-9h1ow8>
70. Card-creation: <https://codesandbox.io/s/card-creation-oe8jw2?file=/src/App.js>
71. Div Slider - <https://codesandbox.io/s/div-slider-5nkp2g?file=/src/index.js>
72. dangerouslysetInnerHtml - <https://codesandbox.io/s/red-morning-6xz15g?file=/src/App.js>
73. Routing - <https://codesandbox.io/s/ecstatic-panini-3lg7xv?file=/src/App.js>
74. PWA - <https://www.youtube.com/watch?v=IaJqMcOMuDM>
75. React Event Propagation: <https://codesandbox.io/s/intelligent-borg-7qzbxr?file=/src/App.js>
76. Server Side Rendering Example - <https://www.youtube.com/c/BeALearnerofficial/videos>
77. Web worker - <https://codesandbox.io/s/web-worker-of8tk4?file=/src/worker.js>
78. Accordion (Expand-Collapse) - <https://codesandbox.io/s/expand-collapse-mcohji?file=/src/App.js>
79. Carousel - <https://codesandbox.io/s/carousel-z4gwg0?file=/src/styles.css>
80. Calculator: <https://codesandbox.io/s/js-calculator-xn7smz?file=/index.html>
81. Counter Function: <https://jsfiddle.net/4ojk3e8x/8/>
82. Basic Todo - <https://codesandbox.io/s/basic-todo-6kfco7?file=/src/App.js>
83. Event bubbling/capturing example - <https://jsfiddle.net/nte61bfh/25/>
84. Progress Bar Indicator - <https://jsfiddle.net/vqumcse5/6/>
85. Dropdown with Checkbox using HTML - <https://codesandbox.io/s/dropdown-checkbox-dh7rux>
86. Height-Width of Document - <https://codesandbox.io/s/height-width-document-4l8ebi?file=/src/App.js>
87. Input Clicked DropDown - <https://codesandbox.io/s/input-click-4kj7mj?file=/package.json>
88. Promise Types - <https://www.youtube.com/watch?v=vQtgi8uElmk>
    1. Promise.all – Resolves all the promises or rejects as soon as any one of them is rejected. It preserves the order in which they are called
    2. Promise.allSettled – Resolves and rejects all the promises and gives data
    3. Promise.any – Whichever promise is resolved first, it returns. If all promises are rejected, it returns aggregate error
    4. Promise.race - Whichever promise is resolved or rejected first, it returns that.

1. Optimization of webpage:
   1. <https://web.dev/fast/#introduction>
   2. <https://www.smashingmagazine.com/2021/01/front-end-performance-2021-free-pdf-checklist/#build-optimizations>
   3. <https://moz.com/learn/seo/page-speed>
2. Strict Mode in JS:
   1. Impossible to create accidental global variables , variables declared without var will not be allowed
   2. No duplicate keys in obj
   3. Freezing the arguments of the function if used within the function
   4. Avoid unexpected assignments (let undefined = 5, let NaN = 20;)
   5. Avoids deleting undeletable properties
   6. Function parameters cannot be same
3. Difference between <script type=module〉and〈script〉
   1. <https://usefulangle.com/post/256/script-type-module-vs-script-javascript#:~:text=The%20%3Cscript%20type%3D%22module,executes%20Javascript%20in%20strict%20mode.&text=A%20normal%20tag%20is,to%20explicitly%20mention%20use%20strict>.
4. JWT(Json Web Token) - <https://jwt.io/introduction/>
5. For vs forEach() vs for/in vs for/of in JavaScript - <https://thecodebarbarian.com/for-vs-for-each-vs-for-in-vs-for-of-in-javascript.html>
6. Object.getOwnPropertyNames() vs Object.keys() - <https://thisthat.dev/object-get-own-property-names-vs-object-keys/>
7. Array Like Objects - <https://dev.to/capscode/what-is-array-like-object-in-javascript-3f5m>
8. Pros and cons of ssr - <https://prerender.io/what-is-srr-and-why-do-you-need-to-know/>
9. Network Optimization:
   1. Lazy loading
   2. Loading JavaScript in async
   3. Content visibility
   4. Serving critical css
   5. Resource hints
   6. Caching using service worker
   7. Caching using CDN
   8. CSR, SSR
   9. Compression techniques
   10. Layout shits & repaints
10. CSS Units –
    1. Px – fixed width, doesn’t cares about parent
    2. % - relative to its parent and adjusts accordingly
    3. Vw/vh – 1 vw/vh is equals to 1% of width/height of entire window size
    4. Rem – relative to the root font size
    5. Em – relative to its parent font size
11. New keyword in Js for function constructors: Performs 3 things
    1. Creates an empty Js object
    2. **this** point to the empty object
    3. Return the object from that function (basically returns this)
12. Typeof vs instanceof –
13. Falsy values - undefined , null , NaN , 0, “”, false
14. CRUD
    1. GET – fetch the record
    2. PUT – add new record if not present, else update the existing record
    3. POST – adds new record, whether present or not
    4. PATCH – only updated the existing record if present
    5. DELETE – delete record from DB
15. How Browsers work - <https://developer.mozilla.org/en-US/docs/Web/Performance/How_browsers_work>
16. Merge Arrays: <https://blog.greenroots.info/5-ways-to-merge-arrays-in-javascript-and-their-differences>
17. Reverse String: <https://www.freecodecamp.org/news/how-to-reverse-a-string-in-javascript-in-3-different-ways-75e4763c68cb/>
18. FCP & LCP - <https://managewp.com/blog/first-contentful-paint>
19. React Error Handling - <https://dev.to/edemagbenyo/handle-errors-in-react-components-like-a-pro-l7l>
20. How web browsers work –
    1. Get resources from server – html, css and JS
    2. Parse HTML and create DOM tree
    3. Create render tree from DOM tree – this includes using CSS and manipulating elements accordingly
    4. Layout – form the final layout : positions the elements as per the screen requirements
    5. Painting – finally the tree is painted on browser and the content is seen by user
21. Convert array like object to array

var ao1 = {length: 0}, // like []

ao2 = {0: 'foo', 5: 'bar', length: 6};

// like ["foo", undefined × 4,"bar"]

You can convert Array-like Objects to their Array counterparts using Array.prototype.slice

var arr = Array.prototype.slice.call(ao1); // []

Interview questions links:

1. <https://docs.google.com/document/d/1_y9ZIjRt1r9qptIuE5qGSEdnaEMMUqfr_MFdFecyaeE/edit>
2. <https://www.techbeamers.com/javascript-interview-questions-answers/>
3. <https://www.educba.com/js-interview-questions/>
4. <https://javascriptinterviewquestions.com/2020/04/100-javascript-interview-questions-to-crack-any-javascript-inteview.html>
5. <https://www.fullstack.cafe/interview-questions/react>
6. <https://roadsidecoder.hashnode.dev/closures-javascript-interview-questions>
7. <https://www.frontendinterviewhandbook.com/javascript-questions#can-you-offer-a-use-case-for-the-new-arrow--function-syntax-how-does-this-new-syntax-differ-from-other-functions>
8. <https://media-exp1.licdn.com/dms/document/C4D1FAQFGsSW5QlKLSg/feedshare-document-pdf-analyzed/0/1650338815253?e=2147483647&v=beta&t=MzCZZ2D_m49rUDfP57t7ypRh6lQF3oaDK8ormBXfUXs>
9. CSS Exercise - <https://www.w3schools.com/css/exercise.asp?filename=exercise_pseudo_elements3>
10. PWA Application example - <https://blog.openreplay.com/building-a-mobile-app-using-html-css-and-javascript>
11. <https://www.w3resource.com/javascript-exercises/javascript-string-exercises.php>

Important Codepens

* + - 1. <https://codepen.io/isladjan/pen/abdyPBw>
      2. <https://codepen.io/isladjan/pen/BazjqKe>
      3. <https://codepen.io/isladjan/pen/qBqPzEX>

DS solved questions in JS

* + - 1. <https://stackblitz.com/edit/js-ecggzz>
      2. <https://stackblitz.com/edit/js-x87g7d?file=index.js>