MathJax and Custom Elements

…

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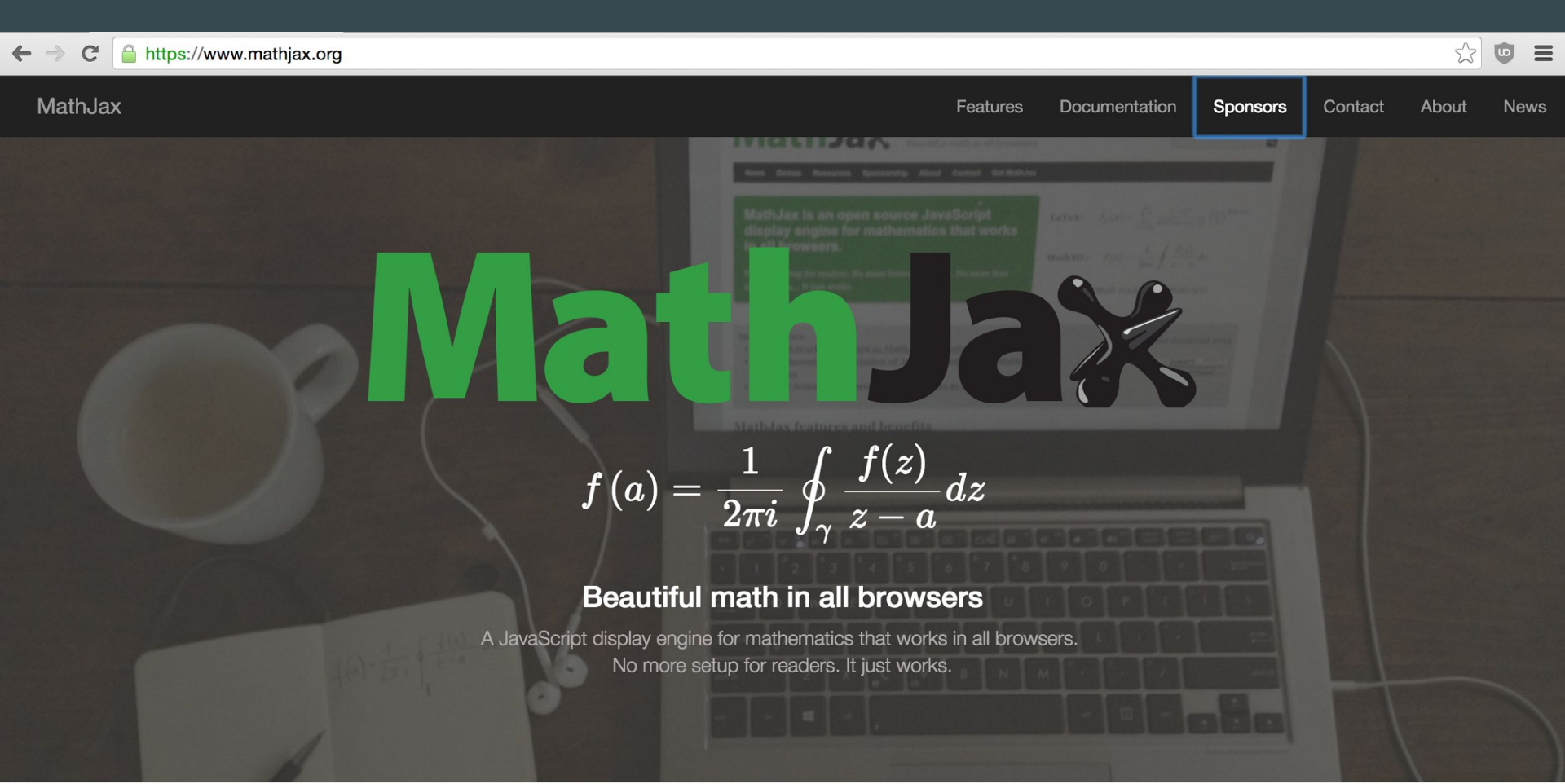
https://www.mathjax.org
MathJax
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$$f(a) = \frac{1}{2\pi i} \oint_\gamma \frac{f(z)}{z-a} dz$$
Beautiful math in all browsers
A JavaScript display engine for mathematics that works in all browsers.
No more setup for readers. It just works.

Different methods to compute $\sum_{k=1}^{\infty} \frac{1}{k^2}$

334

230

As I have heard people did not trust Euler when he first discovered the formula (solution of the Basel problem)

$$\zeta(2) = \sum_{k=1}^{\infty} \frac{1}{k^2} = \frac{\pi^2}{6}.$$

However, Euler was Euler and he gave other proofs.

I believe many of you know some nice proofs of this, can you please share it with us?

(sequences-and-series) (number-theory) (fourier-analysis) (big-list) (faq)

share cite improve this question

edited Aug 13 at 4:02

community wiki
14 revs, 8 users 27%
AD.

asked 4 years ago

viewed 34869 times

active 29 days ago

Demo: Dynamic math with MathJax

demo/dynamic-math.html

Dynamic math with MathJax

```
var elem = DynMath.createElement('a^2+b^2=c^2');
container.appendChild(elem);
DynMath.typeset(elem);
```

Custom Elements

But why?

Semantics for humans

```
<google-map latitude="37.774" longitude="-122.419" fit-to-markers>
  <google-map-marker latitude="37.779" longitude="-122.3892"
      draggable="true" title="Go Giants!"></google-map-marker>
  <google-map-marker latitude="37.777" longitude="-122.389">
    </google-map-marker>
</google-map>
```

https://elements.polymer-project.org/elements/google-map

Semantics for machines?

Robots, scrapers, spiders, search engines ...

But using custom tag names
has been possible for years...

```
<head>
  <style>
    my-element { color: red; }
  </style>
</head>
<body>
  <p>Some paragraph with an <my-element>unknown</my-element>
     element</p>

  <my-element></my-element>

  <p>Another paragraph with a <my-element>mysterious</my-element>
     element</p>
</body>
```

Demo: Unknown element

demo/unknown.html

Registering a Custom Element

```
document.registerElement(tagName, options)
```

Registering a Custom Element

```
document.registerElement(tagName, options)
```

`tagName` must

- contain a hyphen
- not contain upper-case letters
- not be any of `annotation-xml`, `color-profile`, `font-face`, `font-face-src`, `font-face-uri`, `font-face-format`, `font-face-name`, `missing-glyph`

Encapsulation

- No need to add to the global scope
- All access through element instances

Lifecycle callbacks

Get notified when your custom element

- gets created
- is attached to the DOM
- is detached from the DOM
- has an attribute changed

<my-element>

```
(function () {

  var counter = 0,
      element_prototype = Object.create(HTMLElement.prototype);

  element_prototype.createdCallback = function () {
    this.number = ++counter;
    console.log('my-element[%d] created', this.number);
  }

  element_prototype.attachedCallback = function () {
    this.textContent = '[my-element ' + this.number + ']';
    console.log('my-element[%d] attached', this.number);
  }
```

<my-element>

```
element_prototype.detachedCallback = function () {
  console.log('my-element[%d] detached', this.number);
}

element_prototype.attributeChangedCallback =
  function (attr, oldVal, newVal) {
    console.log('my-element[%d] attribute %s change: %s -> %s',
      this.number, attr, oldVal, newVal);
  }
```

<my-element>

```
  document.registerElement('my-element', {
    prototype: element_prototype
  });

})();
```

Demo: <my-element>

demo/pre-load.html

But what if <my-element> is defined *after* using it?

Demo: <my-element> with delay

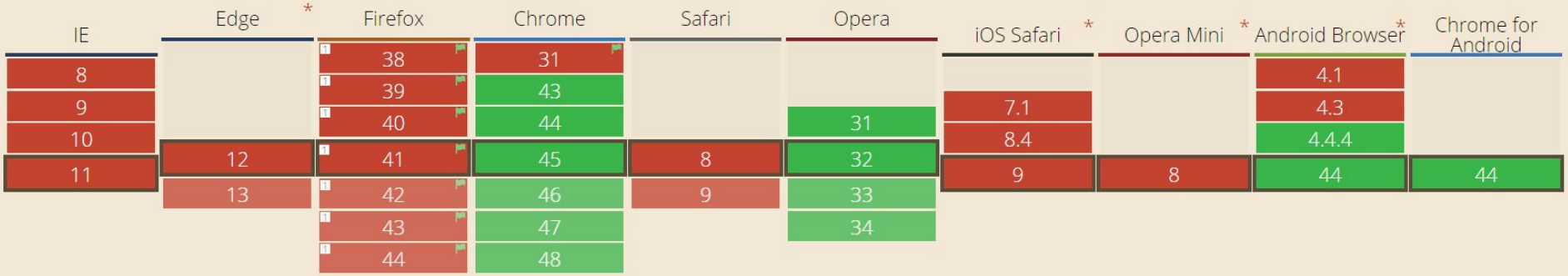
demo/post-load.html

Custom Elements - WD

Method of defining and using new types of DOM elements in a document.

Global	48.14%
Denmark	40.17%

Current aligned | Usage relative | Show all



Notes | Known issues (0) | Resources (10) | Feedback

Current MS Edge status: Under Consideration

[1] Enabled through the "dom.webcomponents.enabled" preference in about:config

Polyfill: webcomponents.js

https://github.com/WebComponents/webcomponentsjs

Browser Support

Our polyfills are intended to work in the latest versions of evergreen browsers. See below for our complete browser support matrix:

Polyfill	IE10	IE11+	Chrome*	Firefox*	Safari 7+*	Chrome Android*	Mobile Safari*
Custom Elements	~	✓	✓	✓	✓	✓	✓
HTML Imports	~	✓	✓	✓	✓	✓	✓
Shadow DOM	✓	✓	✓	✓	✓	✓	✓
Templates	✓	✓	✓	✓	✓	✓	✓

<math-tex>

A <math-tex> custom element

```
<p>Let <math-tex>x \in \mathbb R</math-tex> be a real number</p>

<math-tex display="block">\sum_{k=1}^n k^2</math-tex>
```

… but first: <mathjax-loader>

mathjax-loader.js

```
(function () {

  var states = {start: 1, loading: 2, ready: 3, typesetting: 4},
      state = states.start,
      queue = [],
      src = 'https://cdn.mathjax.org/mathjax/latest/MathJax.js',
      element_prototype = Object.create(HTMLElement.prototype);
```

mathjax-loader.js

```
function load_mathjax(callback) {
  state = states.loading;
  window.MathJax = {
    skipStartupTypeset: true,
    jax: ['input/TeX', 'output/HTML-CSS'],
    TeX: { extensions: ['AMSmath.js', 'AMSsymbols.js'] },
    AuthorInit: function () {
      MathJax.Hub.Register.StartupHook('End',  callback);
    }
  };
  var script = document.createElement('script');
  script.type = 'text/javascript';
  script.src = src;
  script.async = true;
  document.head.appendChild(script);
}
```

mathjax-loader.js

```
element_prototype.attachedCallback = function () {
  if (this.hasAttribute('src'))
    src = this.getAttribute('src');
  load_mathjax(function () {
    state = states.ready;
    flush_queue()
  });
};
```

mathjax-loader.js

```
function flush_queue() {
  var to_process = queue.map(function (elem) {
    return [MathJax.Hub.isJax(elem), elem];
  }).filter(function (item) {
    return item[0] !== 0;
  });
  queue = [];
  if (to_process.length) {
    state = states.typesetting;
    to_process.forEach(function (item) {
      var action = item[0] < 0 ? 'Typeset' : 'Reprocess';
      MathJax.Hub.Queue([action, MathJax.Hub, item[1]]);
    });
    MathJax.Hub.Queue(flush_queue);
  } else
    state = states.ready;
}
```

mathjax-loader.js

```
element_prototype.typeset = function (elem) {
  queue.push(elem);
  if (state === states.ready)
    flush_queue();
};
```

mathjax-loader.js

```
  document.registerElement('mathjax-loader', {
    prototype: element_prototype
  });

})();
```

. . . now back to <math-tex>

math-tex.js

```
(function() {

  var mathjax,
      element_prototype = Object.create(HTMLElement.prototype);

  function check_mathjax() {
    if (mathjax) return;
    mathjax = document.querySelector('mathjax-loader') ||
              document.createElement('mathjax-loader');
    if (!mathjax || typeof mathjax.typeset !== 'function')
      console.warn('no mathjax-loader');
    else if (!document.contains(mathjax))
      document.head.appendChild(mathjax);
  }
```

math-tex.js

```
element_prototype.createdCallback = function () {
  check_mathjax();
  this._jax = document.createElement('script');
  this._jax.type = 'math/tex';
};
```

math-tex.js

```
element_prototype.attachedCallback = function () {
  this._jax.text = this.textContent;
  this.innerHTML = '';
  this.appendChild(this._jax);
  this.update();
};

element_prototype.detachedCallback = function () {
  this.textContent = this._jax.text;
};
```

math-tex.js

```
element_prototype.update = function () {
  this._jax.type = this.getAttribute('display') === 'block' ?
                       'math/tex; mode=display' : 'math/tex';
  if (mathjax && this._jax.parentNode === this)
    mathjax.typeset(this._jax);
}
```

math-tex.js

```
element_prototype.attributeChangedCallback = function (attr) {
  if (attr === 'display')
    this.update();
};
```

math-tex.js

```
Object.defineProperty(element_prototype,'math', {
  get: function () {
    return this._jax.text;
  },
  set: function (value) {
    this._jax.text = value;
    this.update();
  }
});
```

math-tex.js

```
  document.registerElement('math-tex', {
    prototype: element_prototype
  });

})();
```

Demo: Dynamic math again

demo/dynamic-math.html

We can do better

- ShadowDOM
- MutationObserver
- Custom events

Demo: A better <math-tex>

demo/better-math-tex.html

Some resources

- http://webcomponents.org
- https://customelements.io
- https://github.com/janmarthedal/math-tex

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Thank you!

Extras...

github / time-elements

Watch 43 Star 985 Fork 29

Web component extensions to the standard <time> element.

220 commits 1 branch 10 releases 5 contributors

Branch: master time-elements / +

Merge pull request #45 from mateusortiz/master ···

josh authored on Feb 18 latest commit 2e898a205c

examples	Update polyfill example	7 months ago
test	Merge remote-tracking branch 'origin/master' into micro-time-ago	a year ago
.gitignore	Add custom element dependencies	2 years ago
.jshintrc	Tidy some linting	2 years ago
.travis.yml	Make build step default	a year ago
CONTRIBUTING.md	Update package name	a year ago
LICENSE	Add LICENSE	2 years ago
MAINTAINING.md	Update package name	a year ago
Makefile	Make build step default	a year ago
README.md	Update polyfill links	8 months ago
bower.json	Time Elements 0.4.0	a year ago
package.json	Upgrade packages	a year ago

Code
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SSH clone URL

git@github.com:githu

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop

Download ZIP

Type Extensions

```
<time datetime="2015-02-18T15:20:33Z"
      is="time-ago"
      title="Feb 18, 2015, 4:20 PM GMT+1">7 months ago</time>
```

Type Extensions

```
var TimeAgoPrototype = Object.create(HTMLTimeElement.prototype);

window.TimeAgoElement = document.registerElement('time-ago', {
  prototype: TimeAgoPrototype,
  'extends': 'time'
});
```