Data Visualization with ggplot2:

**Basics**

`ggplot2` is based on the grammar of graphics, the idea that you can build every graph from the same components: data, a coordinate system, and geoms—visual marks that represent data points.

**Geoms**

Use a geom function to represent data points, use the geom's aesthetic properties to represent variables. Each function returns a layer.

**GRAPHICAL PRIMITIVES**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>geom_blank()</code></td>
<td>(Useful for expanding limits)</td>
</tr>
<tr>
<td><code>geom_curve()</code></td>
<td>(aes(yend = lat + 1, xend = long + 1))</td>
</tr>
<tr>
<td><code>geom_path</code></td>
<td>(lineend = &quot;butt&quot;, linejoin = &quot;round&quot;, linemitre = 1)</td>
</tr>
<tr>
<td><code>geom_polygon</code></td>
<td>(aes(group = group))</td>
</tr>
<tr>
<td><code>geom_rect</code></td>
<td>(xmin = long, ymin = lat, xmax = long + 1, ymax = lat + 1)</td>
</tr>
<tr>
<td><code>geom_ribbon</code></td>
<td>(aes(ymin = unemploy - 900, ymax = unemploy + 900))</td>
</tr>
</tbody>
</table>

**LINE SEGMENTS**

Common aesthetics: x, y, alpha, color, linetype, size

<table>
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<tr>
<td><code>geom_abline()</code></td>
<td>(aes(intercept = 0, slope = 1))</td>
</tr>
<tr>
<td><code>geom_hline()</code></td>
<td>(aes(xintercept = long))</td>
</tr>
<tr>
<td><code>geom_vline()</code></td>
<td>(aes(xintercept = long))</td>
</tr>
</tbody>
</table>

**ONE VARIABLE**

Continuous

```r
c <- ggplot(mpg, aes(hwy))
c + geom_area(stat = "bin")
```

Discrete

```r
d <- ggplot(mpg, aes(fct))
d + geom_bar()
```

**TWO VARIABLES**

Continuous

```r
e <- ggplot(mpg, aes(cty, hwy))
e + geom_label(aes(label = cty), nudge.x = 1, nudge.y = 2, check_overlap = TRUE)
```

Discrete

```r
f <- ggplot(mpg, aes(class, hwy))
f + geom_col()
```

**THREE VARIABLES**

```r
g <- ggplot(diamonds, aes(carat, price, color))
g + geom_hex()
```

**Cheat Sheet**

Complete the template below to build a graph.

```r
ggplot(data = ...) +
  geom_function(mapping = aes(...)) +
  coord_function(position = ...)
```

`ggplot(data = mpg, aes(x = cty, y = hwy))` Begins a plot that you finish by adding layers to. Add one geom function per layer.

**Legend**

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