

Math X - Graphics Intro

Prolog

- Reminder difference among `()`, `{}`, and `[]`.
-

Graphics

- **Graphics vs. Drawing Tools**

Students in both classes have already asked why we would want to program graphics when we can just draw using the new Drawing Tools. They don't yet see how we will want to connect the code with variable and parameters to make functions and dynamic modules.

- **Simple examples of primitives**

```
Graphics[{Circle[]}]
Graphics[{Circle[]}, Axes → True]
Graphics[{Circle[{1, 1}, 0.5]}, Axes → True]
Graphics[{Circle[{1, 1}, 0.5]}, Axes → True, PlotRange → 5]
Graphics[{Disk[{1, 1}, 0.5]}, Axes → True, PlotRange → 5]
Graphics[{Line[{{0, 0}, {1, 1}, {2, -3}}]}, Axes → True, PlotRange → 5]
Graphics[{Arrow[{{0, 0}, {1, 1}, {2, -3}}]}, Axes → True, PlotRange → 5]
Graphics[{Polygon[{{0, 0}, {1, 1}, {2, -3}}]}, Axes → True, PlotRange → 5]
Graphics[{Point[{{0, 0}, {1, 1}, {2, -3}}]}, Axes → True, PlotRange → 5]
Graphics[{Rectangle[{-3, -2}, {1, 4}]}, Axes → True, PlotRange → 5]
Graphics[{Text["Some Text", {1, 1}]}, Axes → True, PlotRange → 5]
```

- **Including Directives**

```
Graphics[{Red, Disk[{1, 1}, 0.5]}, Axes → True, PlotRange → 5]
Graphics[{Red, Thick, Circle[{1, 1}, 0.5]}, Axes → True, PlotRange → 5]
Graphics[{Red, Thick, Dashing[Medium], Circle[{1, 1}, 0.5]}, Axes → True, PlotRange → 5]
```

More than one Primitive

```
Graphics[{{Red, Disk[{1, 1}, 0.5]}, {Blue, Circle[{0, 3}, 1]}}]

Graphics[{{Red, Disk[{1, 1}, 0.5]}, {Blue, Circle[{0, 3}, 1]}}, PlotRange → 5, Axes → True]

Graphics[{{Red, Disk[{1, 1}, 0.5]}, {Blue, Circle[{0, 3}, 1]},
  {Purple, PointSize[0.02], Point[{-1, -1]}}}, PlotRange → 5, Axes → True]

?Graphics

Graphics[{{Red, Disk[{1, 1}, 0.5]},
  {Blue, Circle[{0, 3}, 1]}, {Purple, PointSize[0.02], Point[{-1, -1]}},
  {Darker[Green], Arrow[{{0, 0}, {1, 2}, {2, -2}]}}}, PlotRange → 5, Axes → True]

Graphics[{
  {Red, Disk[{1, 1}, 0.5]}, {Blue, Circle[{0, 3}, 1]},
  {Purple, PointSize[0.02], Point[{-1, -1]}},
  {Darker[Green], Arrow[{{0, 0}, {1, 2}, {2, -2}]}}},
  {Gray, Opacity[0.5], Polygon[{{-2, 3}, {4, -5}, {0, 3}, {-2, 1}]}}
}, PlotRange → 5, Axes → True]
```

Task

- Create an image using at least three different Graphics primitives and directives.
- Let me know what questions you have and I'll see what may be good for a lesson next class.

Graphics with Manipulate

- Using last example above

```
Manipulate[

Graphics[{
  {clr, Disk[{1, 1}, 0.5]}, {Blue, Circle[{0, 3}, 1]}, {Purple, PointSize[0.02],
    Point[{x, x]}}, {Darker[Green], Arrow[{{0, 0}, {1, 2}, {2, -2}]}}},
  {Gray, Opacity[0.5], Polygon[{{-2, 3}, {4, -5}, {0, 3}, {-2, 1}]}}
}, PlotRange → 5, Axes → True],

{clr, ColorSlider}, {x, -5, 5}]
```