Week 1 Module 4: Lines and Polygons

Exercises

Let's clear the global computing environment:

```
rm( list =)
```

Exercises for Week 1 Module 4: Lines and Polygons

Exercise 4.1: Draw a line segment

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 10.

Then draw a line segment starting at the point (3, 7) and ending at the point (12, 4).

Solution

```
# Type your answer in here
```

Exercise 4.2: Line type, width, and color

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 10.

Then draw a dotted line segment starting at the point (3, 7) and ending at the point (12, 4), using a line width of 3 and a color of "cadetblue3".

Solution

```
# Type your answer here
```

Exercise 4.3: Annual profit line graph

The annual profit for WiDgT for the years 2016 - 2019 is:

Year	Annual Profit (M)
2016	1.3
2017	1.6
2018	2.1
2019	2.2

Create a connected graph of the annual profits using the `plot()` function. Include both the line as well as the points.

Solution

```
# Type your answer here
```

Exercise 4.4: Using the `lines()` function

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 10.

Then draw two connected line segments:

- The first line segment starts at the point (3, 7) and ends at the point (12, 4).
- The second line segment starts at the point (12, 4) and ends at the point (16, 9).

Use a solid line with a width of 2 and a color of "aquamarine3".

Solution

```
# Type your answer here
```

Exercise 4.5: 3-4-5 Right Triangle

Create an empty plot with no data, where the x-axis ranges from 0 to 10 and the y-axis ranges from 0 to 7. Create a 3-4-5 right triangle using the `polygon()` function, and specify a border color and a fill color. Hint: start at the point (3, 5), then go down 3 units, then go right for 4 units.

Solution

```
# Type your answer here
```

Solutions to the Exercises

Exercise 4.1: Draw a line segment

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 510.

Then draw a line segment starting at the point (3, 7) and ending at the point (12, 4).

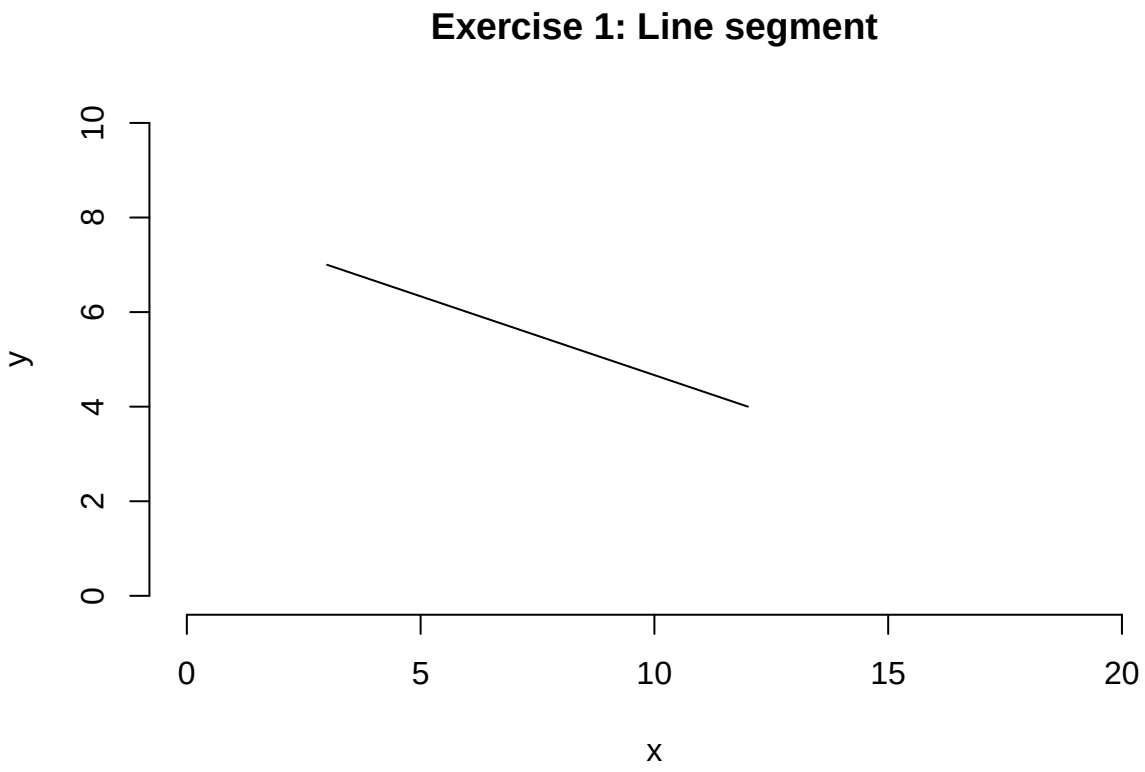
Solution

```
# First, let's create the empty plot with no data:

plot(
    x = NULL,
    xlim = c(0, 20),
    ylim = c(0, 10),
    main = "Exercise 1: Line segment",
    xlab = "x",
    ylab = "y",
    bty = "n"
)

# Now let's draw the line segment:
```

```
segments(
    x0 = 3,
    y0 = 7,
    x1 = 12,
    y1 = 4
)
```



Exercise 4.2: Line type, width, and color

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 10.

Then draw a dotted line segment starting at the point (3, 7) and ending at the point (12, 4), using a line width of 3 and a color of "cadetblue3".

Solution

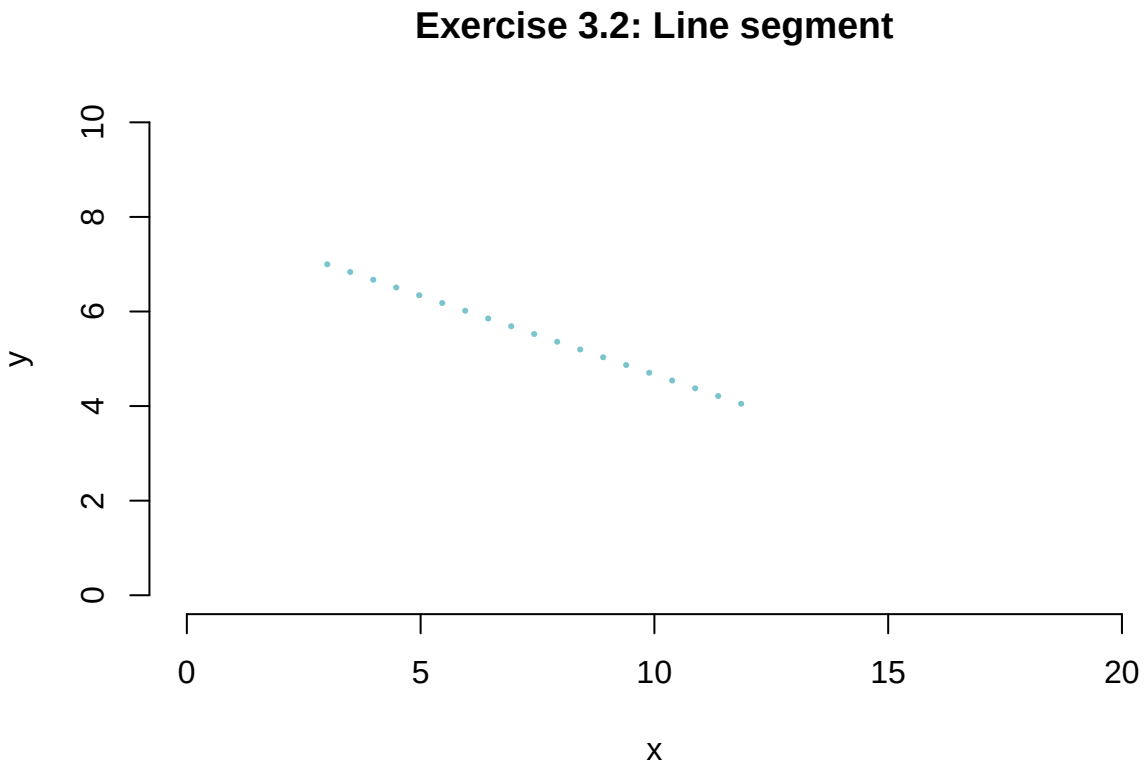
```
# First, let's create the empty plot with no data:

plot(
    x = NULL,
    xlim = c(0, 20),
    ylim = c(0, 10),
    main = "Exercise 3.2: Line segment",
    xlab = "x",
    ylab = "y",
```

```
    bty = "n"
)

# Now let's draw the line segment:

segments(
    x0 = 3,
    y0 = 7,
    x1 = 12,
    y1 = 4,
    lty = "dotted",
    lwd = 3,
    col = "cadetblue3"
)
```



Exercise 4.3: Annual profit line graph

The annual profit for WiDgT for the years 2016 - 2019 is:

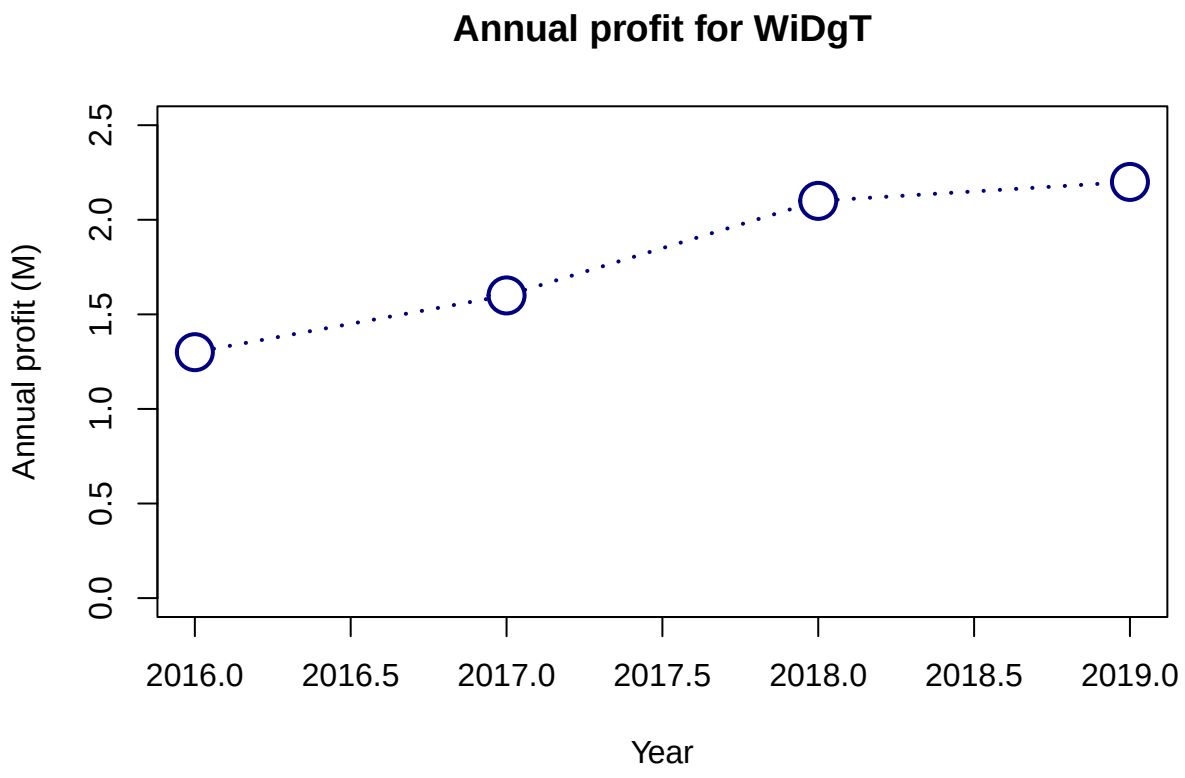
Year	Annual Profit (M)
2016	1.3
2017	1.6
2018	2.1

Year	Annual Profit (M)
2019	2.2

Create a connected graph of the annual profits using the `plot()` function. Include both the line as well as the points.

Solution

```
plot(
    x = c(2016, 2017, 2018, 2019),
    y = c(1.3, 1.6, 2.1, 2.2),
    xlim = c(2016, 2019),
    ylim = c(0, 2.5),
    main = "Annual profit for WiDgT",
    xlab = "Year",
    ylab = "Annual profit (M)",
    col = "navy",
    cex = 2.5,
    lty = "dotted",
    lwd = 2,
    type = "b"
)
```



Exercise 4.4: Using the `lines()` function

Create an empty plot with no data, with x ranging from 0 to 20 and y ranging from 0 to 10.

Then draw two connected line segments:

- The first line segment starts at the point (3, 7) and ends at the point (12, 4).
- The second line segment starts at the point (12, 4) and ends at the point (16, 9).

Use a solid line with a width of 2 and a color of "aquamarine3".

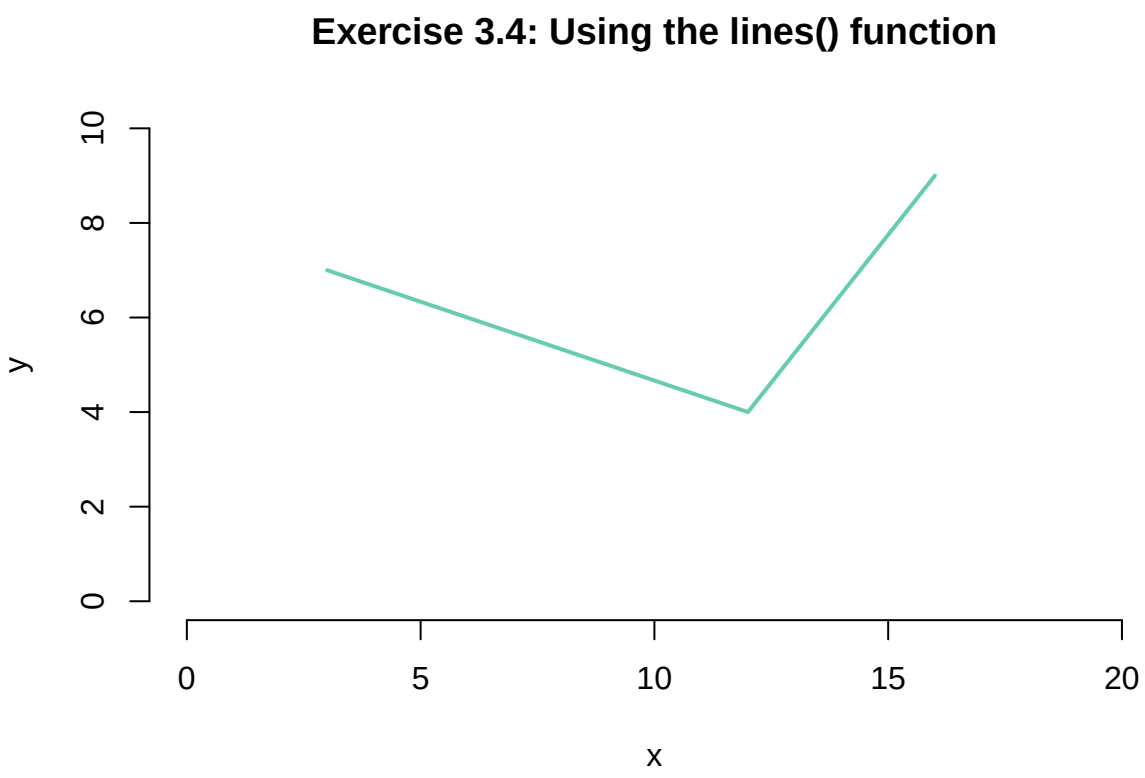
Solution

```
# First, let's create the empty plot with no data:

plot(
    x = NULL,
    xlim = c(0, 20),
    ylim = c(0, 10),
    main = "Exercise 3.4: Using the lines() function",
    xlab = "x",
    ylab = "y",
    bty = "n"
)

# Now let's draw the line segments using
# the lines() function:

lines(
    x = c(3, 12, 16),
    y = c(7, 4, 9),
    lty = "solid",
    lwd = 2,
    col = "aquamarine3"
)
```



Exercise 4.5: 3-4-5 Right Triangle

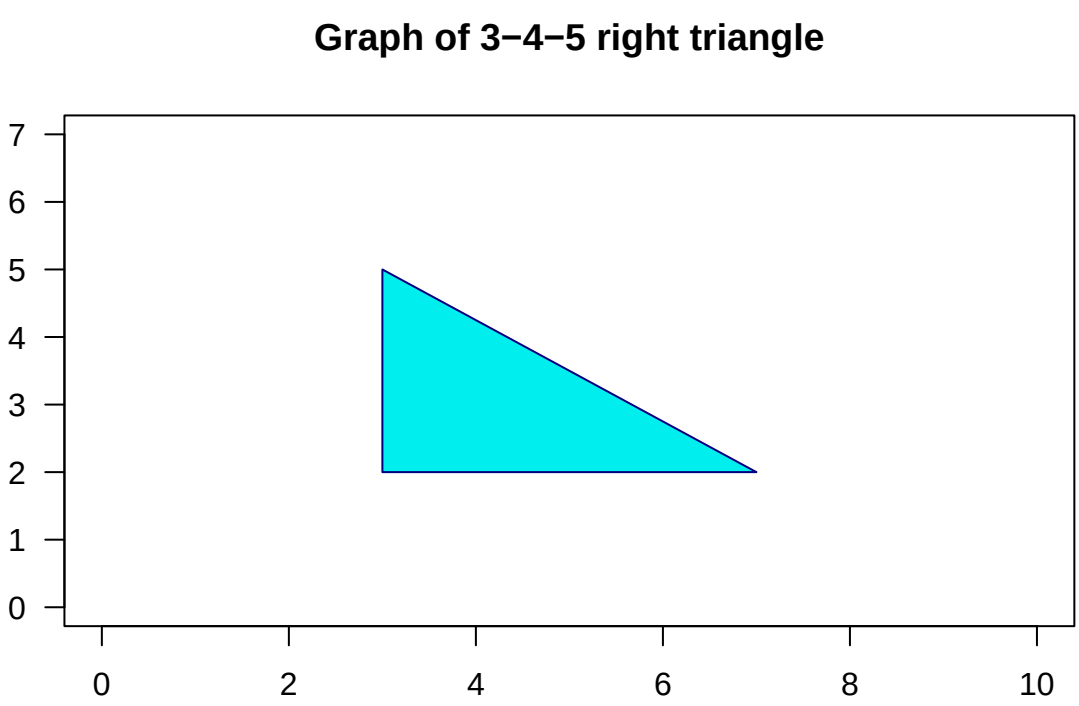
Create an empty plot with no data, where the x-axis ranges from 0 to 10 and the y-axis ranges from 0 to 7. Create a 3-4-5 right triangle using the `polygon()` function, and specify a border color and a fill color. Hint: start at the point (3, 5), then go down 3 units, then go right for 4 units.

Solution

Here's my solution:

```
plot(
    x = NULL,
    xlim = c(0, 10),
    ylim = c(0, 7),
    main = "Graph of 3-4-5 right triangle",
    xlab = "",
    ylab = "",
    las = 1
)

polygon(
    c(3, 3, 7),
    c(5, 2, 2),
    border = "navy",
    col = "cyan2"
)
```


Graph of 3−4−5 right triangle
7
6
5
4
3
2
1
0
0
2
4
6
8
10