In [43]:
```
using Gadfly
using Interact
```

In [2]:
```
set_default_plot_size(15cm, 15cm)
```

$$U_A = x_1^A x_2^A \qquad U_B = x_1^B x_2^B$$

In [3]:
```
U_A(x1, x2) = x1*x2
U_B(x1, x2) = (ω1-x1)*(ω2-x2);
```

In [4]:
```
plot_U_A(x,x1,x2) = U_A(x1, x2)/x
plot_U_B(x,x1,x2) = U_B(x1, x2)/(x-ω1)+ω2;
```

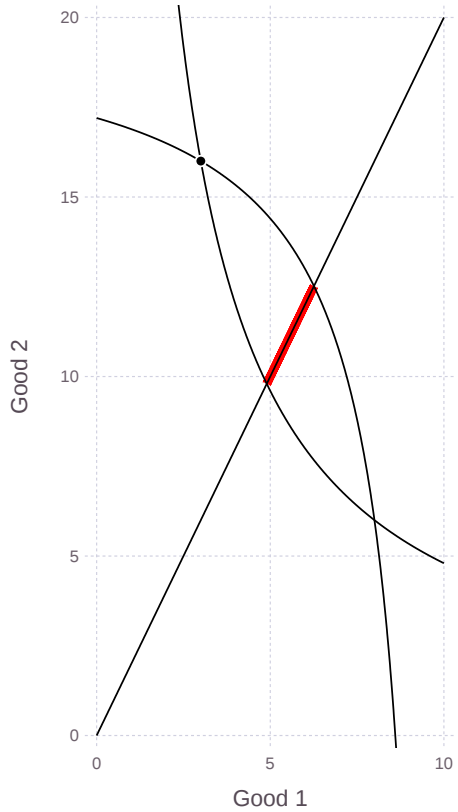
In [41]:
```
ω1 = 10
ω2 = 20

@manipulate for x1 in 1:ω1-1, x2 in 1:ω2-1
    domain = linspace(0, ω1, 1000)
    lower_intercept = (U_A(x1, x2)/2)^(1/2)
    upper_intercept = (2ω1+ω2-((2ω1+ω2)^2-8*(ω1*ω2-U_B(x1,x2)))^(1/2))/4
    plot(
        # Initial State
        layer(x=[x1], y=[x2], Geom.point, Theme(default_color=colorant"black")),
        layer(x=domain, y=plot_U_A(domain, x1, x2), Geom.line, Theme(default_color=colorant"black")),
        layer(x=domain, y=plot_U_B(domain, x1, x2), Geom.line, Theme(default_color=colorant"black")),
        layer(x=domain, y=2*domain, Geom.line, Theme(default_color=colorant"black")),
        # Core
        layer(x=linspace(lower_intercept, upper_intercept, 1000), y=2*linspace(lower_intercept, upper_int
        # Setup
        Coord.Cartesian(xmin=0,xmax=ω1,ymin=0,ymax=ω2,fixed=true),
        Guide.xlabel("Good 1"),
        Guide.ylabel("Good 2")
        )
end
```

x1 3

x2 16

Out[41]:



Add Prices

In [6]:
```
B_x1(ω1_A, ω2_A, P1, P2) = (P1*ω1_A+P2*ω2_A)/(2P1)
B_x2(ω1_A, ω2_A, P1, P2) = (P1*ω1_A+P2*ω2_A)/(2P2)
B_line(x, ω1_A, ω2_A, P1, P2) = -(P1/P2)*x+(P1*ω1_A+P2*ω2_A)/P2;
```

In [42]:
```
 = 210
 = 210

anipulate for ω1_A in 0:10:ω1-1, ω2_A in 0:10:ω2-1, P1 in 1:10, P2 in 1:10
  domain = linspace(0, ω1, 1000)
  lower_intercept = (U_A(ω1_A, ω2_A))^(1/2)
  upper_intercept = (ω1+ω2-((ω1+ω2)^2-4*(ω1*ω2-U_B(ω1_A, ω2_A)))^(1/2))/2
  plot(
      # Initial State
      layer(x=[ω1_A], y=[ω2_A], Geom.point),
      layer(x=domain, y=plot_U_A(domain, ω1_A, ω2_A), Geom.line),
      layer(x=domain, y=plot_U_B(domain, ω1_A, ω2_A), Geom.line),
      layer(x=domain, y=domain, Geom.line, Theme(default_color=colorant"black")),
      # Core
      layer(x=linspace(lower_intercept, upper_intercept, 1000), y=linspace(lower_intercept, upper_intercep
      # Exchange
      layer(x=[B_x1(ω1_A, ω2_A, P1, P2)], y=[B_x2(ω1_A, ω2_A, P1, P2)], Geom.point, Theme(default_color=co
      layer(x=[ω1-B_x1(ω1-ω1_A, ω2-ω2_A, P1, P2)], y=ω2-[B_x2(ω1-ω1_A, ω2-ω2_A, P1, P2)], Geom.point, Them
      layer(x=domain, y=B_line(domain, ω1_A, ω2_A, P1, P2), Geom.line, Theme(default_color=colorant"black"
      layer(x=domain, y=plot_U_A(domain, B_x1(ω1_A, ω2_A, P1, P2), B_x2(ω1_A, ω2_A, P1, P2)), Geom.line, T
      layer(x=domain, y=plot_U_B(domain, ω1-B_x1(ω1-ω1_A, ω2-ω2_A, P1, P2), ω2-B_x2(ω1-ω1_A, ω2-ω2_A, P1,
      # Setup
      Coord.Cartesian(xmin=0,xmax=ω1,ymin=0,ymax=ω2,fixed=true),
      Guide.xlabel("Good 1"),
      Guide.ylabel("Good 2")
      )
d
```

ω1_A 30

ω2_A 170

P1 8

P2 5

Out[42]: