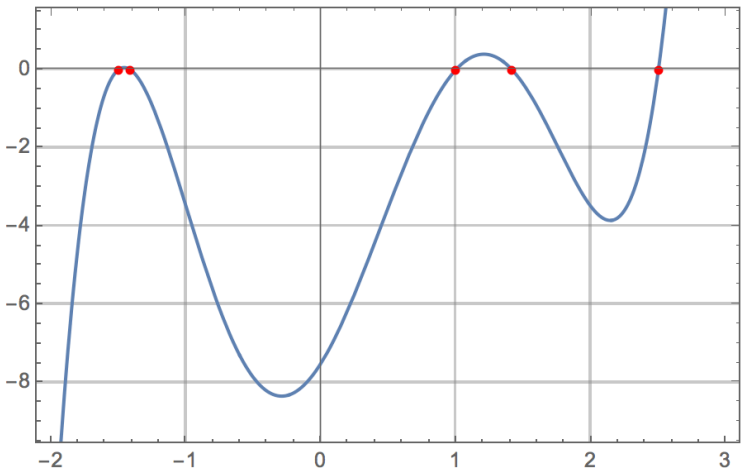
Uppgift 1: Problemlösning

Problem 3.1)

The problem is to find the solutions(roots) of 5 degree polynomial

Figure



Name of Variables :
f(x) and x

The Solutions of the problem is

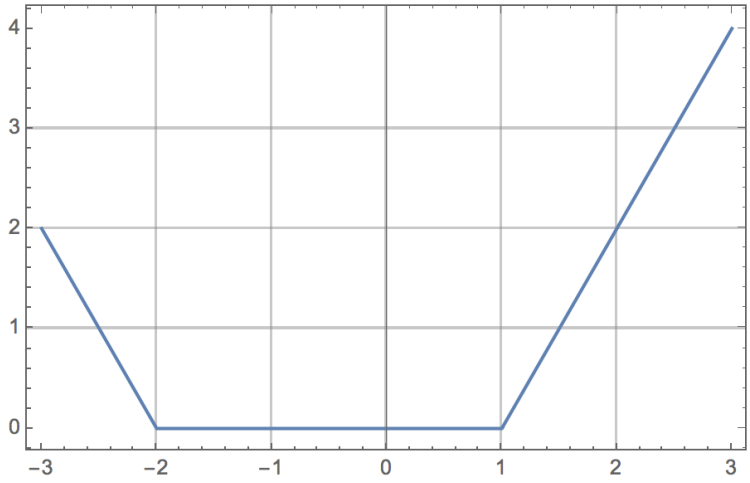
```
f[x_] := x^5 - 2 x^4 - 19/4 x^3 + 31/4 x^2 + 11/2 x - 15/2;

Solve[f[x] == 0, x]

-> {{x -> -(3/2)}, {x -> 1}, {x -> 5/2}, {x -> -Sqrt[2]}, {x -> Sqrt[2]}}

roots = ListPlot[{{-3/2, 0}, {1, 0}, {5/2, 0}, {-Sqrt[2],
     0}, {Sqrt[2], 0}}, PlotStyle -> Red,
   PlotStyle -> PointSize[0.02]];

Show[Plot[\!\(TraditionalForm\`f[x]\), {x, -2, 3}], roots,
 PlotRange -> {{-2, 3}, {-9, 1}} , Frame -> True,
 GridLines -> Automatic]
```

Discuss the result:
The value of the root {{x -> -(3/2)}, {x -> 1}, {x -> 5/2}, {x -> -Sqrt[2]}, {x -> Sqrt[2]}}
satisfy the five degree polynomial (f[x] = 0)

Problem 3.2)

The problem is to find the solution(values of x) of the absolute function.

figure



Name of varibales
x, g[x].

The solutions of the problem is

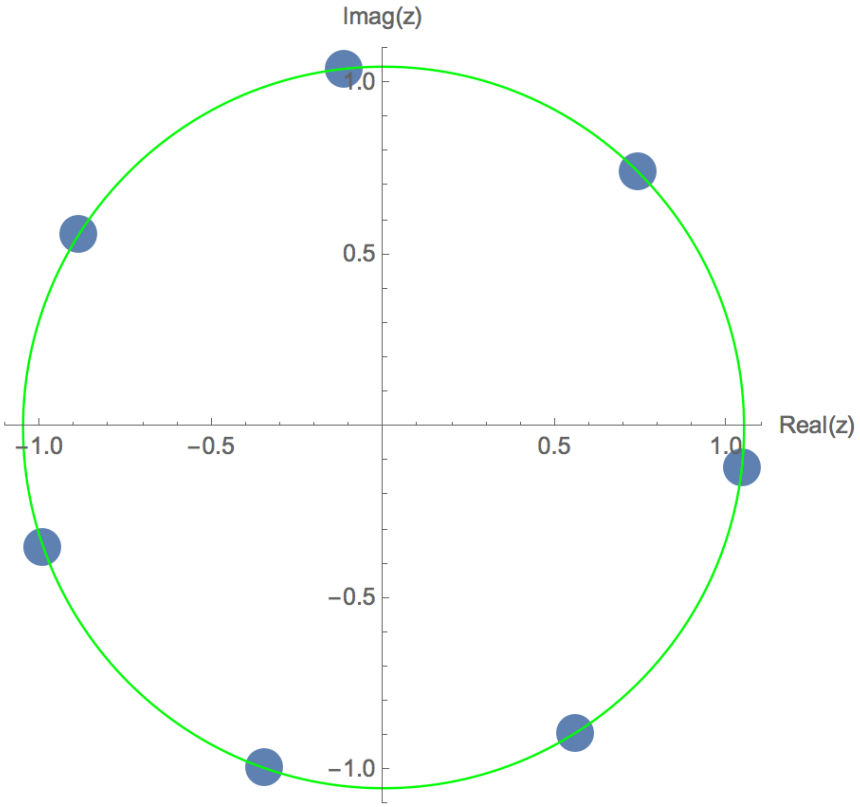
```
g[x_] := Abs[x - 1] + Abs[x + 2] - 3;
Plot[\!\(TraditionalForm\`g[x]\), {x, -3, 3}, Frame -> True,
 GridLines -> Automatic]

Reduce[\!\(TraditionalForm\`\(TraditionalForm\`g[x]\)\) ==
  0, x, Integers]

-> x == -2 || x == -1 || x == 0 || x == 1
```

Discuss :
its found there are 4 root that satisfy this absolut function
x == -2 || x == -1 || x == 0 || x == 1

Problem 3.3)

The problem is to find complex roots of the 7:e degree complex function.

figure



Name of variables : z : complexVariable , Complexroots = the Roots of Complex Function

The solution is :
ComplexRoots = NSolve[z^7 == 1 - I, z]

-> {-0.991792 - 0.347043 I, -0.889701 + 0.559036 I, -0.347043 -
  0.991792 I, -0.117647 + 1.04415 I, 0.559036 - 0.889701 I,
 0.742997 + 0.742997 I, 1.04415 - 0.117647 I}

ComplexPlot = ListPlot[{Re[z], Im[z]} /. ComplexRoots,   PlotRange -> {{ -1.1, 1.1}, {-1.1, 1.1}},

AxesLabel -> {"Real(z)", "Imag(z)"}, AspectRatio -> 1,
  PlotStyle -> PointSize[0.05]];

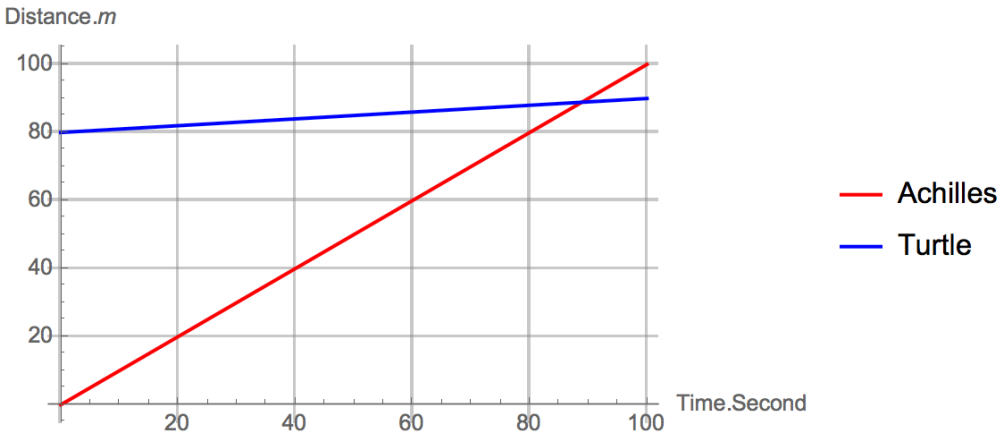
Show[ComplexPlot, Graphics[{Green, Circle[{0, 0}, 1.05]}]]

Discus :
its found there are 7 complex roots that solve 7 degree complex function

Problem 3.4)

The problem is to find who will reach the first 100m between Achilles and the turtle

Figure



Variables:
t: time(second), DistA[t] : distiane function of Achilles , DistT[t] : distiane function of Turtle

The solutions is :
Achilles comes over Turtle after t = 88,8889 s

// suppose that speed of Achilles is 1 m/s , then turtles speed is 0.1 m/s
// Distance=speed * Time

```
DistA[t_] := t
DistT[t_] := 80 + 0.1 t
NSolve[DistA[t] == DistT[t]]
Plot[{DistA[t], DistT[t]}, {t, 0, 100}, GridLines -> Automatic,
 PlotStyle -> {Red, Blue}, AxesLabel -> {Time.Second, Distance.m},
 PlotLegends -> {"Achilles", “Turtle"}]
```

—> {{t -> 88.8889}}

Discus :
Assuming speed of Achilles is 1 m/s then Turtles speed is 0,1t m/s. Achilles meets Turtle at 88,8889 second .