

```
In[ ]:= SetDirectory[
  "C:/Users/serha/OneDrive/Masaüstü/MyRepo/master_thesis_MMT003/210628_finalising/
  fxd_coefficients"];
```

Fixed Coefficients (Initial Obj. Func. Term Series)

Objective Function, Interval: (2,4), bounds: {5, 250}, term amounts: {105, doubled, quadrupled}

Data Input

```
In[ ]:= case = "coeffs";
{a1, a2, a3} = {"250", "105", "(2,4)"};
{b1, b2, b3} = {"250", "quadrupled", "(2,4)"};
{c1, c2, c3} = {"5", "105", "(2,4)"};
{d1, d2, d3} = {"5", "doubled", "(2,4)"};
{e1, e2, e3} = {"5", "quadrupled", "(2,4)"};
{a, b, c, d, e} =
{"-" <> a1 <> "+" <> a1 <> "_" <> a2 <> "_" <> a3, "-" <> b1 <> "+" <> b1 <> "_" <> b2 <> "_" <> b3,
 "-" <> c1 <> "+" <> c1 <> "_" <> c2 <> "_" <> c3, "-" <> d1 <> "+" <> d1 <> "_" <> d2 <> "_" <> d3,
 "-" <> e1 <> "+" <> e1 <> "_" <> e2 <> "_" <> e3};

In[ ]:= modularityvalues1s =
  Import["plot_values/fxd_" <> case <> "/" <> a <> "-modularityvalues-fss.mx"];
modularityvalues2s = Import["plot_values/fxd_" <>
  case <> "/" <> b <> "-modularityvalues-fss.mx"];
modularityvalues3s = Import["plot_values/fxd_" <> case <>
  "/" <> c <> "-modularityvalues-fss.mx"];
modularityvalues4s = Import["plot_values/fxd_" <> case <>
  "/" <> d <> "-modularityvalues-fss.mx"];
modularityvalues5s = Import["plot_values/fxd_" <> case <>
  "/" <> e <> "-modularityvalues-fss.mx"];

modularityvalues1b =
  Import["plot_values/fxd_" <> case <> "/" <> a <> "-modularityvalues-fbs.mx"];
modularityvalues2b = Import["plot_values/fxd_" <>
  case <> "/" <> b <> "-modularityvalues-fbs.mx"];
modularityvalues3b = Import["plot_values/fxd_" <> case <>
  "/" <> c <> "-modularityvalues-fbs.mx"];
modularityvalues4b = Import["plot_values/fxd_" <> case <>
  "/" <> d <> "-modularityvalues-fbs.mx"];
modularityvalues5b = Import["plot_values/fxd_" <> case <>
  "/" <> e <> "-modularityvalues-fbs.mx"];
```



```

In[ ]:= zscores1s = Import["plot_values/fxd_" <> case <> "/" <> a <> "-zscores-fss.mx"];
zscores2s = Import["plot_values/fxd_" <> case <> "/" <> b <> "-zscores-fss.mx"];
zscores3s = Import["plot_values/fxd_" <> case <> "/" <> c <> "-zscores-fss.mx"];
zscores4s = Import["plot_values/fxd_" <> case <> "/" <> d <> "-zscores-fss.mx"];
zscores5s = Import["plot_values/fxd_" <> case <> "/" <> e <> "-zscores-fss.mx"];

zscores1b = Import["plot_values/fxd_" <> case <> "/" <> a <> "-zscores-fbs.mx"];
zscores2b = Import["plot_values/fxd_" <> case <> "/" <> b <> "-zscores-fbs.mx"];
zscores3b = Import["plot_values/fxd_" <> case <> "/" <> c <> "-zscores-fbs.mx"];
zscores4b = Import["plot_values/fxd_" <> case <> "/" <> d <> "-zscores-fbs.mx"];
zscores5b = Import["plot_values/fxd_" <> case <> "/" <> e <> "-zscores-fbs.mx"];

In[ ]:= deletionrange = Range[0, 450, 50]
Out[ ]:= {0, 50, 100, 150, 200, 250, 300, 350, 400, 450}

In[ ]:= modularityvaluesS = {Thread[{deletionrange, modularityvalues1s}],
  Thread[{deletionrange, modularityvalues2s}],
  Thread[{deletionrange, modularityvalues3s}], Thread[
  {deletionrange, modularityvalues4s}], Thread[{deletionrange, modularityvalues5s}]];
modularityvaluesB = {Thread[{deletionrange, modularityvalues1b}],
  Thread[{deletionrange, modularityvalues2b}],
  Thread[{deletionrange, modularityvalues3b}], Thread[
  {deletionrange, modularityvalues4b}], Thread[{deletionrange, modularityvalues5b}]];

In[ ]:= singlerandommodularityvaluesS =
  {Thread[{deletionrange, singlerandomerdrenmodularityvalues1s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues1s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues2s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues2s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues3s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues3s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues4s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues4s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues5s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues5s}]];
singlerandommodularityvaluesB =
  {Thread[{deletionrange, singlerandomerdrenmodularityvalues1b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues1b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues2b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues2b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues3b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues3b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues4b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues4b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues5b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues5b}]];

```

```

In[6]:= zscoresS = {Thread[{deletionrange, zscores1s[[All, 1]]}],
  Thread[{deletionrange, zscores1s[[All, 2]]}],
  Thread[{deletionrange, zscores2s[[All, 1]]}], Thread[
  {deletionrange, zscores2s[[All, 2]]}], Thread[{deletionrange, zscores3s[[All, 1]]}],
  Thread[{deletionrange, zscores3s[[All, 2]]}],
  Thread[{deletionrange, zscores4s[[All, 1]]}],
  Thread[{deletionrange, zscores4s[[All, 2]]}],
  Thread[{deletionrange, zscores5s[[All, 1]]}],
  Thread[{deletionrange, zscores5s[[All, 2]]}]];
zscoresB = {Thread[{deletionrange, zscores1b[[All, 1]]}],
  Thread[{deletionrange, zscores1b[[All, 2]]}],
  Thread[{deletionrange, zscores2b[[All, 1]]}], Thread[
  {deletionrange, zscores2b[[All, 2]]}], Thread[{deletionrange, zscores3b[[All, 1]]}],
  Thread[{deletionrange, zscores3b[[All, 2]]}],
  Thread[{deletionrange, zscores4b[[All, 1]]}],
  Thread[{deletionrange, zscores4b[[All, 2]]}],
  Thread[{deletionrange, zscores5b[[All, 1]]}],
  Thread[{deletionrange, zscores5b[[All, 2]]}]];

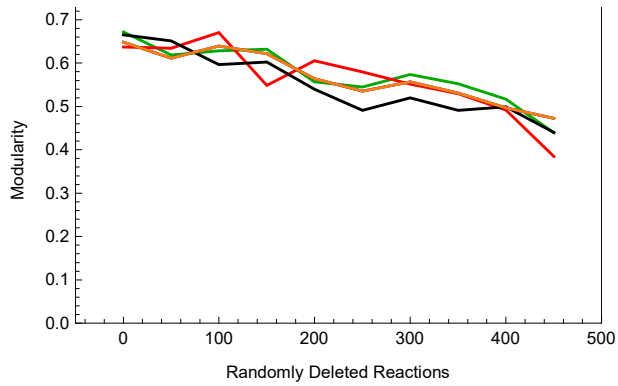
```

Plots

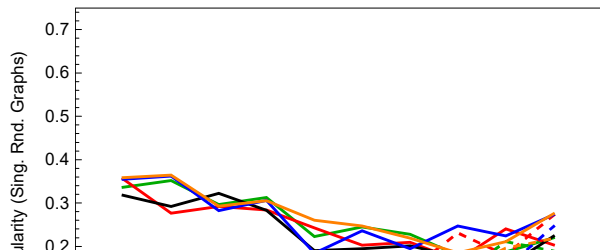
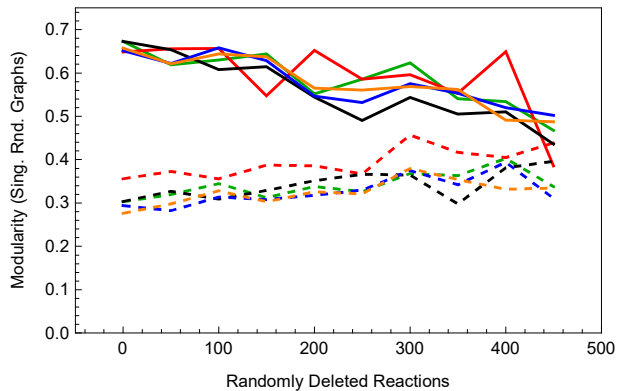
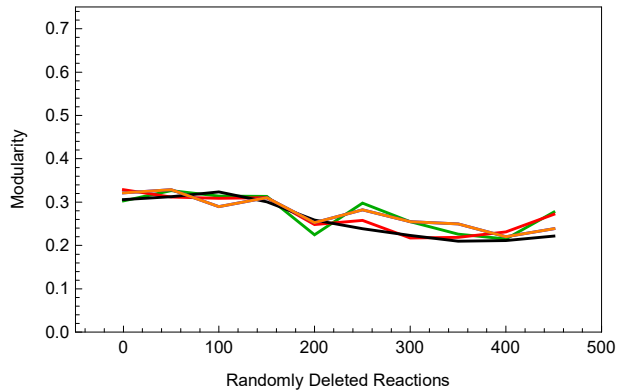
```

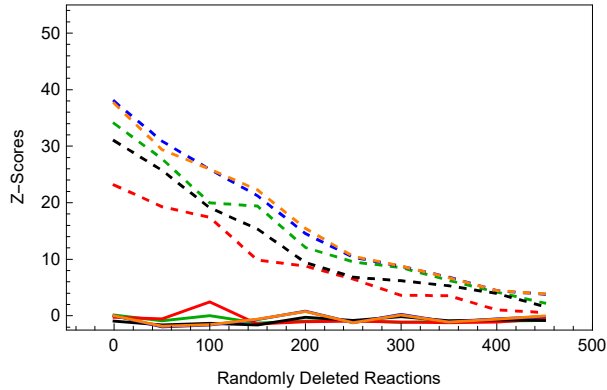
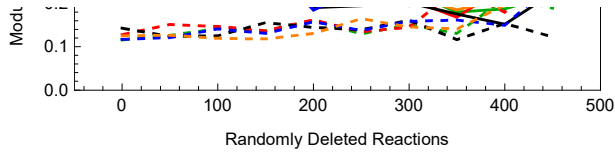
In[ ]:= padding = 38;
modularityplotrange = {0, 0.75};
axisplotrange = {-50, 500};
zscorerange = {-2.5, 55};
Row[{
  Column[{ListLinePlot[modularityvaluesS, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Modularity", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {Darker@Green, Red, Black, Blue, Orange}, ImageSize → 350,
    PlotRange → {axisplotrange, modularityplotrange}], ListLinePlot[modularityvaluesB,
    Frame → True, ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Modularity", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {Darker@Green, Red, Black, Blue, Orange}, ImageSize → 350,
    PlotRange → {axisplotrange, modularityplotrange}]]],
  Column[{ListLinePlot[singlerandommodularityvaluesS, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}}, FrameLabel →
    {"Modularity (Sing. Rnd. Graphs)", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, modularityplotrange}],
    ListLinePlot[singlerandommodularityvaluesB, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}}, FrameLabel →
    {"Modularity (Sing. Rnd. Graphs)", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, modularityplotrange}]]],
  Column[{ListLinePlot[zscoresS, Frame → True, ImagePadding → padding,
    FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Z-Scores", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, zscorerange}], ListLinePlot[zscoresB,
    Frame → True, ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Z-Scores", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, zscorerange}]]],
  Column[{LineLegend[{Darker@Green, Red, Black, Blue, Orange},
    {"[- <> a1 <> ", "<> a1 <> "] -> " <> a2, "[- <> b1 <> ", "<> b1 <> "] -> " <> b2,
    "[- <> c1 <> ", "<> c1 <> "] -> " <> c2, "[- <> d1 <> ", "<> d1 <> "] -> " <> d2,
    "[- <> e1 <> ", "<> e1 <> "] -> " <> e2}, LegendLayout → "Column", LegendFunction →
    "Frame", LegendLabel → "Constrained\nBound Intervals", LegendMarkerSize → {20, 20}],
    LineLegend[{Dashed, Black}, {"Degrees Fixed\nNull Model", "Modularity\nNull Model"},
    LegendLayout → "Column", LegendFunction → "Frame", LegendMarkerSize → {20, 20}]]]]]

```



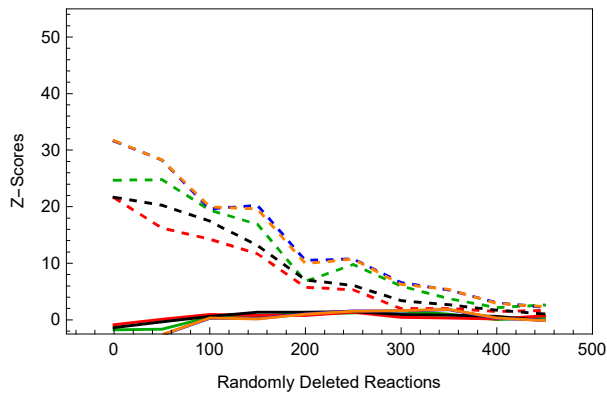
Out[*n*]=





Constrained
Bound Intervals

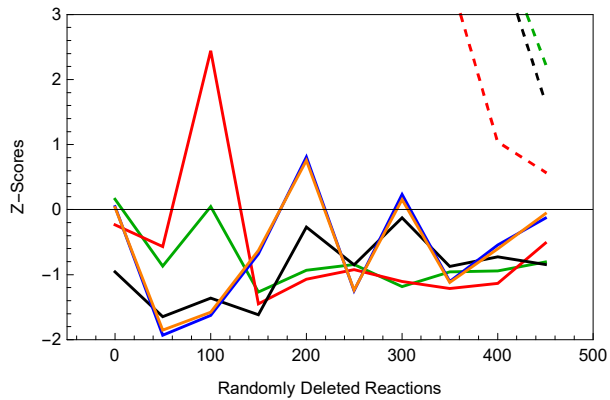
- [-250,250] -> 105
- [-250,250] -> quadrupled
- [-5,5] -> 105
- [-5,5] -> doubled
- [-5,5] -> quadrupled



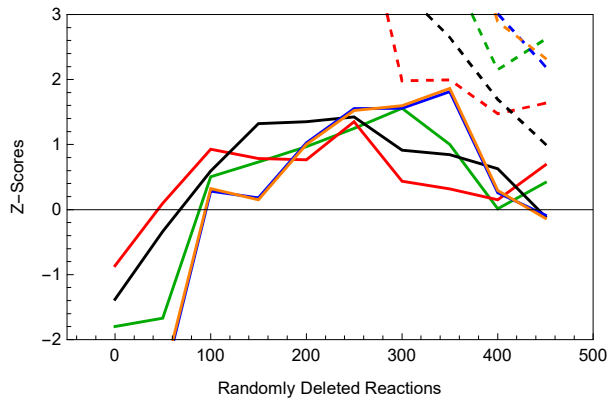
--- Degrees Fixed
Null Model

— Modularity
Null Model

```
In[ ]:= Column[{ListLinePlot[zscoresS, Frame -> True,
  ImagePadding -> padding, FrameTicks -> {{All, None}, {All, None}},
  FrameLabel -> {{ "Z-Scores", None}, {"Randomly Deleted Reactions", None}},
  PlotStyle -> {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
  ImageSize -> 350, PlotRange -> {xaxisplorange, {-2, 3}}, ListLinePlot[zscoresB,
  Frame -> True, ImagePadding -> padding, FrameTicks -> {{All, None}, {All, None}},
  FrameLabel -> {{ "Z-Scores", None}, {"Randomly Deleted Reactions", None}},
  PlotStyle -> {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
  ImageSize -> 350, PlotRange -> {xaxisplorange, {-2, 3}}}]}
```



Out[8]=



Objective Function, Interval: (-1,1), bounds: {5, 250}, term amounts: {105, doubled, quadrupled}

Data Input

```
In[9]:= case = "coeffs";
{a1, a2, a3} = {"250", "105", "(-1,1)"};
{b1, b2, b3} = {"250", "quadrupled", "(-1,1)"};
{c1, c2, c3} = {"5", "105", "(-1,1)"};
{d1, d2, d3} = {"5", "doubled", "(-1,1)"};
{e1, e2, e3} = {"5", "quadrupled", "(-1,1)"};
{a, b, c, d, e} =
{"-" <> a1 <> "+" <> a1 <> "_" <> a2 <> "_" <> a3, "-" <> b1 <> "+" <> b1 <> "_" <> b2 <> "_" <> b3,
 "-" <> c1 <> "+" <> c1 <> "_" <> c2 <> "_" <> c3, "-" <> d1 <> "+" <> d1 <> "_" <> d2 <> "_" <> d3,
 "-" <> e1 <> "+" <> e1 <> "_" <> e2 <> "_" <> e3};
```



```

In[6]:= modularityvalues1s =
  Import["plot_values/fxd_" <> case <> "/" <> a <> "-modularityvalues-fss.mx"];
modularityvalues2s = Import["plot_values/fxd_" <>
  case <> "/" <> b <> "-modularityvalues-fss.mx"];
modularityvalues3s = Import["plot_values/fxd_" <> case <>
  "/" <> c <> "-modularityvalues-fss.mx"];
modularityvalues4s = Import["plot_values/fxd_" <> case <>
  "/" <> d <> "-modularityvalues-fss.mx"];
modularityvalues5s = Import["plot_values/fxd_" <> case <>
  "/" <> e <> "-modularityvalues-fss.mx"];

modularityvalues1b =
  Import["plot_values/fxd_" <> case <> "/" <> a <> "-modularityvalues-fbs.mx"];
modularityvalues2b = Import["plot_values/fxd_" <>
  case <> "/" <> b <> "-modularityvalues-fbs.mx"];
modularityvalues3b = Import["plot_values/fxd_" <> case <>
  "/" <> c <> "-modularityvalues-fbs.mx"];
modularityvalues4b = Import["plot_values/fxd_" <> case <>
  "/" <> d <> "-modularityvalues-fbs.mx"];
modularityvalues5b = Import["plot_values/fxd_" <> case <>
  "/" <> e <> "-modularityvalues-fbs.mx"];

```

[illegible]

```

In[ ]:= zscores1s = Import["plot_values/fxd_" <> case <> "/" <> a <> "-zscores-fss.mx"];
zscores2s = Import["plot_values/fxd_" <> case <> "/" <> b <> "-zscores-fss.mx"];
zscores3s = Import["plot_values/fxd_" <> case <> "/" <> c <> "-zscores-fss.mx"];
zscores4s = Import["plot_values/fxd_" <> case <> "/" <> d <> "-zscores-fss.mx"];
zscores5s = Import["plot_values/fxd_" <> case <> "/" <> e <> "-zscores-fss.mx"];

zscores1b = Import["plot_values/fxd_" <> case <> "/" <> a <> "-zscores-fbs.mx"];
zscores2b = Import["plot_values/fxd_" <> case <> "/" <> b <> "-zscores-fbs.mx"];
zscores3b = Import["plot_values/fxd_" <> case <> "/" <> c <> "-zscores-fbs.mx"];
zscores4b = Import["plot_values/fxd_" <> case <> "/" <> d <> "-zscores-fbs.mx"];
zscores5b = Import["plot_values/fxd_" <> case <> "/" <> e <> "-zscores-fbs.mx"];

In[ ]:= deletionrange = Range[0, 450, 50]
Out[ ]:= {0, 50, 100, 150, 200, 250, 300, 350, 400, 450}

In[ ]:= modularityvaluesS = {Thread[{deletionrange, modularityvalues1s}],
  Thread[{deletionrange, modularityvalues2s}],
  Thread[{deletionrange, modularityvalues3s}], Thread[
  {deletionrange, modularityvalues4s}], Thread[{deletionrange, modularityvalues5s}]}];
modularityvaluesB = {Thread[{deletionrange, modularityvalues1b}],
  Thread[{deletionrange, modularityvalues2b}],
  Thread[{deletionrange, modularityvalues3b}], Thread[
  {deletionrange, modularityvalues4b}], Thread[{deletionrange, modularityvalues5b}]}];

In[ ]:= singlerandommodularityvaluesS =
  {Thread[{deletionrange, singlerandomerdrenmodularityvalues1s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues1s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues2s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues2s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues3s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues3s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues4s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues4s}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues5s}],
  Thread[{deletionrange, singlerandomcommmodularityvalues5s}]}];
singlerandommodularityvaluesB =
  {Thread[{deletionrange, singlerandomerdrenmodularityvalues1b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues1b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues2b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues2b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues3b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues3b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues4b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues4b}],
  Thread[{deletionrange, singlerandomerdrenmodularityvalues5b}],
  Thread[{deletionrange, singlerandomcommmodularityvalues5b}]}];

```

```

In[6]:= zscoresS = {Thread[{deletionrange, zscores1s[[All, 1]]}],
  Thread[{deletionrange, zscores1s[[All, 2]]}],
  Thread[{deletionrange, zscores2s[[All, 1]]}], Thread[
    {deletionrange, zscores2s[[All, 2]]}], Thread[{deletionrange, zscores3s[[All, 1]]}],
  Thread[{deletionrange, zscores3s[[All, 2]]}],
  Thread[{deletionrange, zscores4s[[All, 1]]}],
  Thread[{deletionrange, zscores4s[[All, 2]]}],
  Thread[{deletionrange, zscores5s[[All, 1]]}],
  Thread[{deletionrange, zscores5s[[All, 2]]}]];
zscoresB = {Thread[{deletionrange, zscores1b[[All, 1]]}],
  Thread[{deletionrange, zscores1b[[All, 2]]}],
  Thread[{deletionrange, zscores2b[[All, 1]]}], Thread[
    {deletionrange, zscores2b[[All, 2]]}], Thread[{deletionrange, zscores3b[[All, 1]]}],
  Thread[{deletionrange, zscores3b[[All, 2]]}],
  Thread[{deletionrange, zscores4b[[All, 1]]}],
  Thread[{deletionrange, zscores4b[[All, 2]]}],
  Thread[{deletionrange, zscores5b[[All, 1]]}],
  Thread[{deletionrange, zscores5b[[All, 2]]}]];

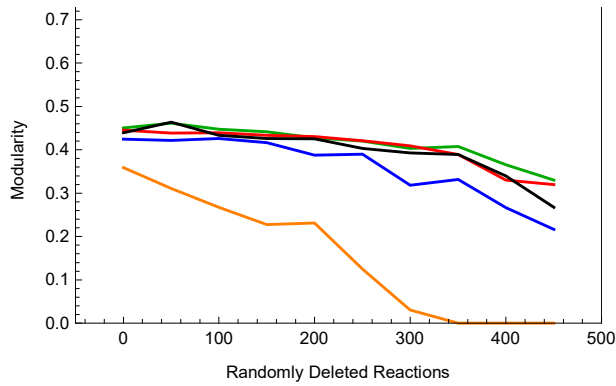
```

[Plots](#)

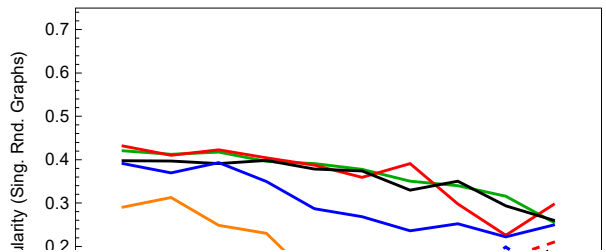
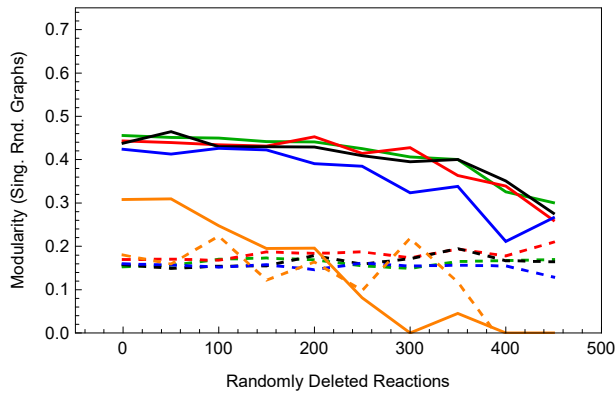
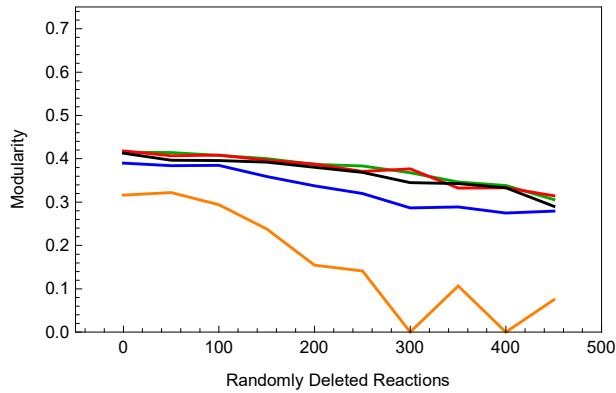
```

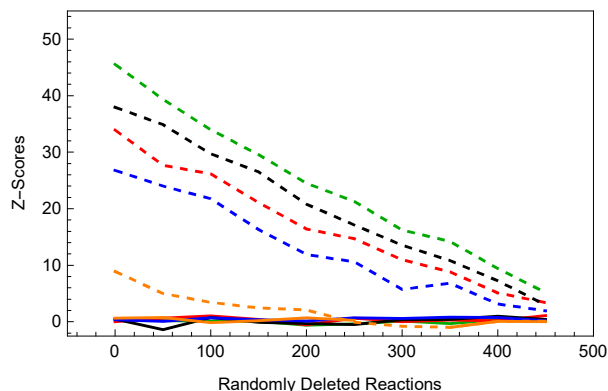
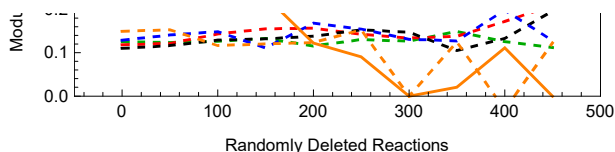
In[ ]:= padding = 38;
modularityplotrange = {0, 0.75};
axisplotrange = {-50, 500};
zscorerange = {-2.5, 55};
Row[{
  Column[{ListLinePlot[modularityvaluesS, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Modularity", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {Darker@Green, Red, Black, Blue, Orange}, ImageSize → 350,
    PlotRange → {axisplotrange, modularityplotrange}], ListLinePlot[modularityvaluesB,
    Frame → True, ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Modularity", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {Darker@Green, Red, Black, Blue, Orange}, ImageSize → 350,
    PlotRange → {axisplotrange, modularityplotrange}]]],
  Column[{ListLinePlot[singlerandommodularityvaluesS, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}}, FrameLabel →
    {"Modularity (Sing. Rnd. Graphs)", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, modularityplotrange}],
    ListLinePlot[singlerandommodularityvaluesB, Frame → True,
    ImagePadding → padding, FrameTicks → {{All, None}, {All, None}}, FrameLabel →
    {"Modularity (Sing. Rnd. Graphs)", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, modularityplotrange}]]],
  Column[{ListLinePlot[zscoresS, Frame → True, ImagePadding → padding,
    FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Z-Scores", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, zscorerange}], ListLinePlot[zscoresB,
    Frame → True, ImagePadding → padding, FrameTicks → {{All, None}, {All, None}},
    FrameLabel → {"Z-Scores", None}, {"Randomly Deleted Reactions", None}},
    PlotStyle → {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
    ImageSize → 350, PlotRange → {axisplotrange, zscorerange}]]],
  Column[{LineLegend[{Darker@Green, Red, Black, Blue, Orange},
    {"[" < a1 < ", " < a1 < "] -> " < a2, "[" < b1 < ", " < b1 < "] -> " < b2,
    "[" < c1 < ", " < c1 < "] -> " < c2, "[" < d1 < ", " < d1 < "] -> " < d2,
    "[" < e1 < ", " < e1 < "] -> " < e2}, LegendLayout → "Column", LegendFunction →
    "Frame", LegendLabel → "Constrained\nBound Intervals", LegendMarkerSize → {20, 20}],
    LineLegend[{Dashed, Black}, {"Degrees Fixed\nNull Model", "Modularity\nNull Model"},
    LegendLayout → "Column", LegendFunction → "Frame", LegendMarkerSize → {20, 20}]]]]]

```



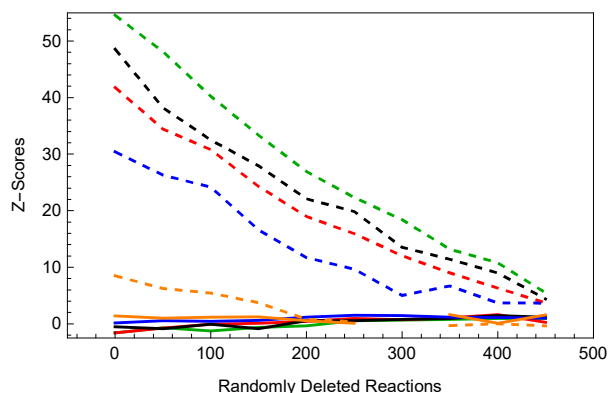
$Out[n]=$





Constrained
Bound Intervals

- [-250,250] -> 105
- [-250,250] -> quadrupled
- [-5,5] -> 105
- [-5,5] -> doubled
- [-5,5] -> quadrupled



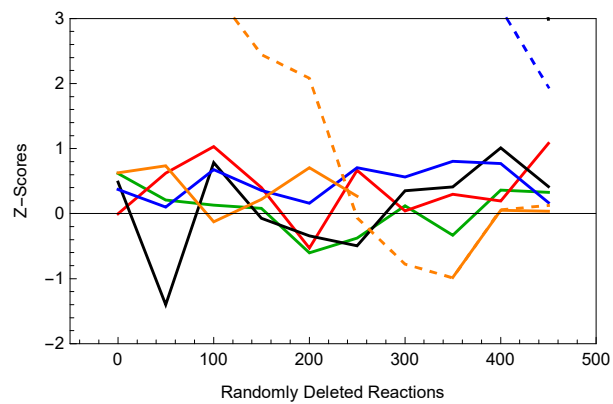
--- Degrees Fixed
Null Model

— Modularity
Null Model

```

In[ ]:= Column[{ListLinePlot[zscoresS, Frame -> True,
  ImagePadding -> padding, FrameTicks -> {{All, None}, {All, None}},
  FrameLabel -> {{ "Z-Scores", None}, {"Randomly Deleted Reactions", None}},
  PlotStyle -> {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
  ImageSize -> 350, PlotRange -> {xaxisplorange, {-2, 3}}, ListLinePlot[zscoresB,
  Frame -> True, ImagePadding -> padding, FrameTicks -> {{All, None}, {All, None}},
  FrameLabel -> {{ "Z-Scores", None}, {"Randomly Deleted Reactions", None}},
  PlotStyle -> {{Dashed, Darker@Green}, Darker@Green, {Dashed, Red}, Red,
    {Dashed, Black}, Black, {Dashed, Blue}, Blue, {Dashed, Orange}, Orange},
  ImageSize -> 350, PlotRange -> {xaxisplorange, {-2, 3}}]}]

```



Out[8]=

