Programming Clinic 2

OA Fakinlede

```
(*
Written by: OA Fakinlede August 2019
   Graphical Demo of Cross product
*)
d1 = Cylinder[{{0, 0, 0}, {.009, .009, .009}}, 1.5];
d2 = Cylinder[{{0, 0, 0}, {.01, .01, .01}}, 2.5];
d3 = Cylinder[{{0, 0, 0}, {.008, .008, .008}}, 2.0];
Arrow1 = Arrow[Tube[{{0, 0, 0}, {1, 1, 1}}, 0.1]];
Manipulate[
 Manipulate[
  Graphics3D[{{Green, Rotate[d1, α π / 20, {1, 1, -1}, {.005, .005, .005}],
     Rotate[Arrow1, α π / 20, {1, 1, -1}, {.005, .005, .005}]},
    {Blue, Rotate[Arrow1, β π / 20, {1, -.5, -.5}, {.005, .005, .005}],
     Rotate[d3, β π / 20, {1, -.5, -.5}, {.005, .005, .005}]}, {Red, Arrow1, d2}}, Boxed -> F
  {α, 0, 20}], {β, 0, 20}]
```

Example One

rr

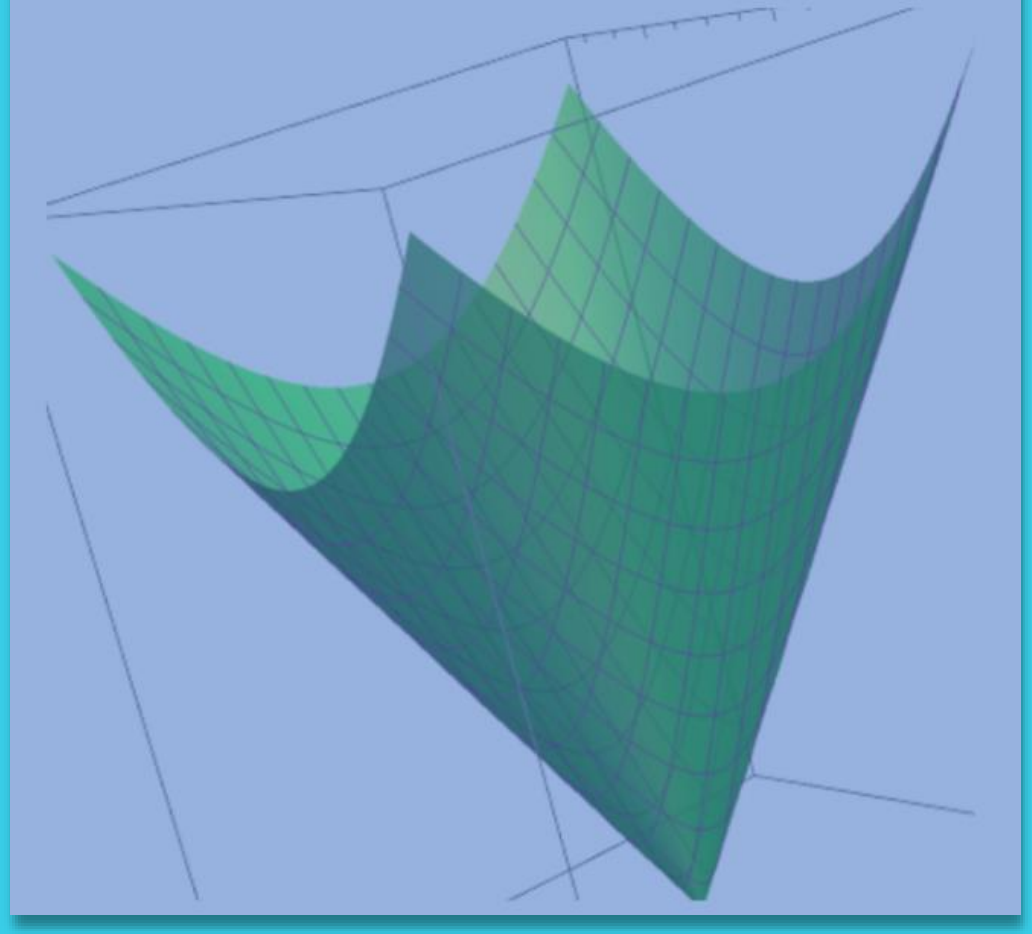
```
g[x_, n_] := (2 / Pi) Sin[Pi x (2 n - 1)] / (2 n - 1)
S[x_, N_] := (1 / 2) + Sum[g[x, n], {n, 1, N}]
Manipulate[Grid[{{Plot[S[x, M], {x, -.1, 1.1}, PlotRange → 1.3]},
    {Plot[1 - S[x, M], {x, -.1, 1.1}, PlotRange → .1]}}], {{M, 3, "Number of Terms"}, 0, 100, 5}]
```

Example Two

Example Three

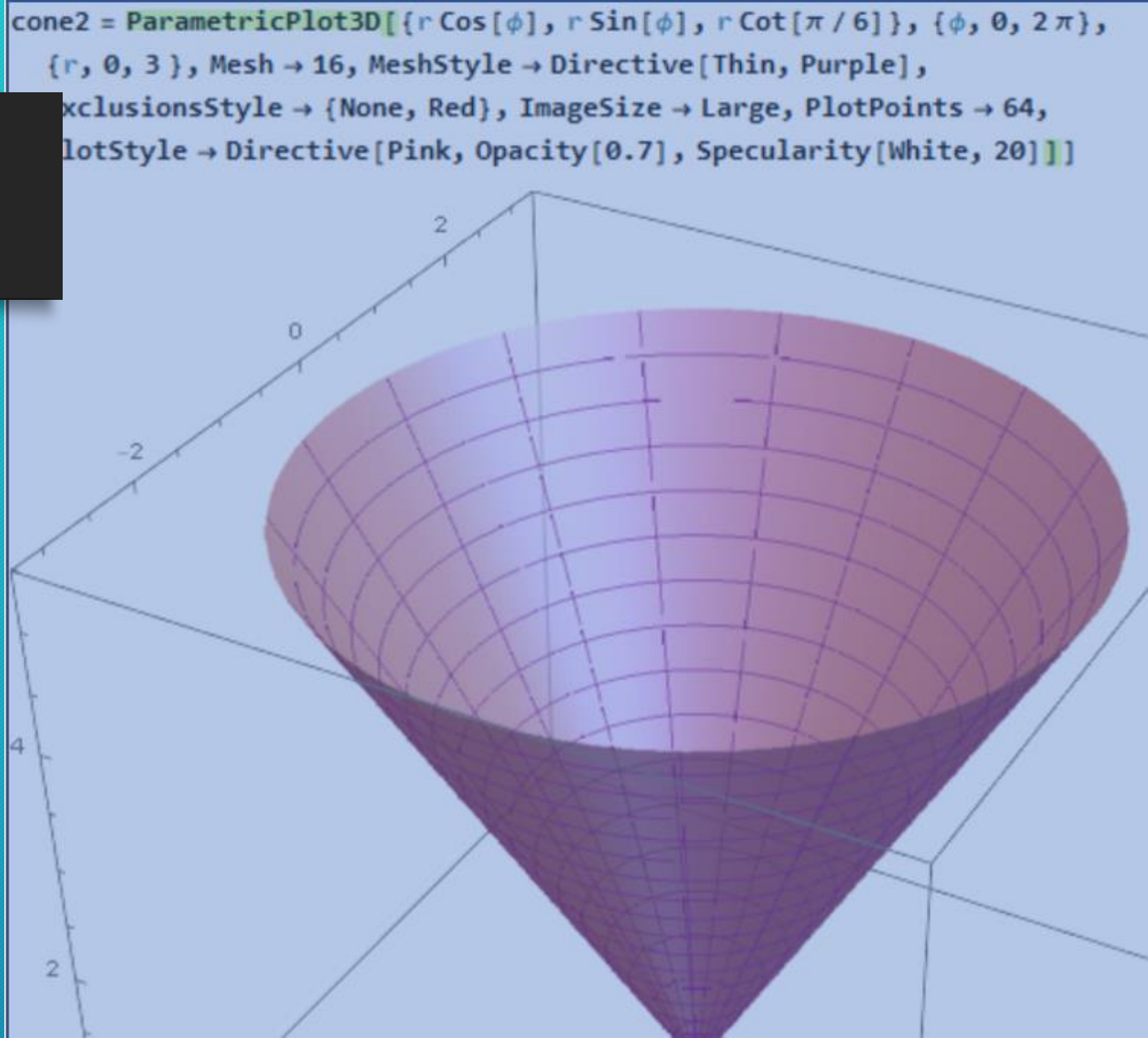
- A cone parametrized by Cartesian coordinates

```
cone1 = ParametricPlot3D[{x, y, Cot[π / 6] Sqrt[x^2 + y^2]},
  {x, -3, 3}, {y, -3, 3}, Mesh → 16, MeshStyle →
   Directive[Thin, Purple], ExclusionsStyle → {None, Red},
  ImageSize → Large, PlotPoints → 64, PlotStyle → Evaluate
    [Directive[Green, Opacity[0.7], Specularity[White, 20]]]]
```

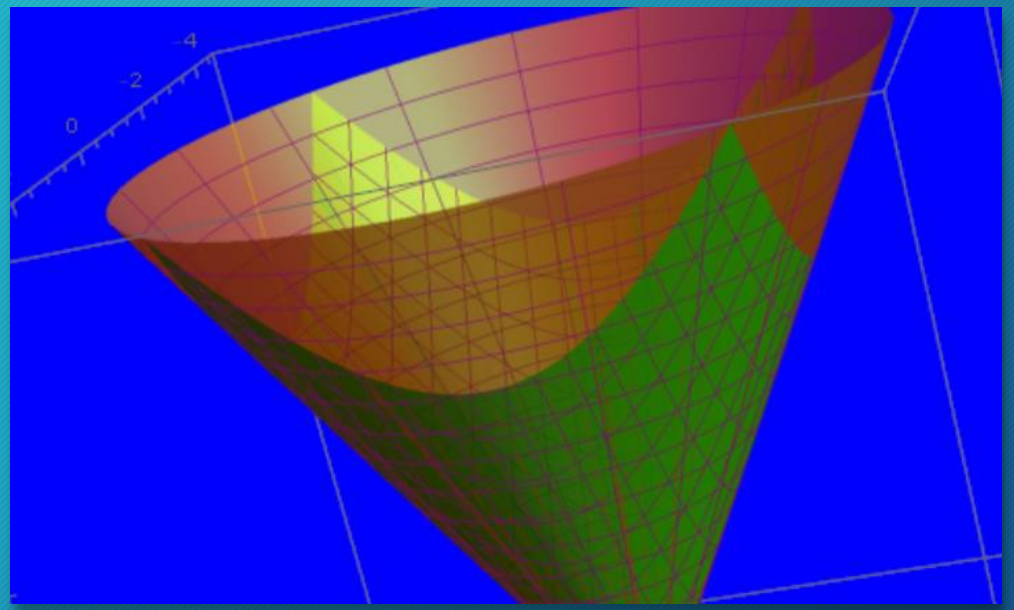


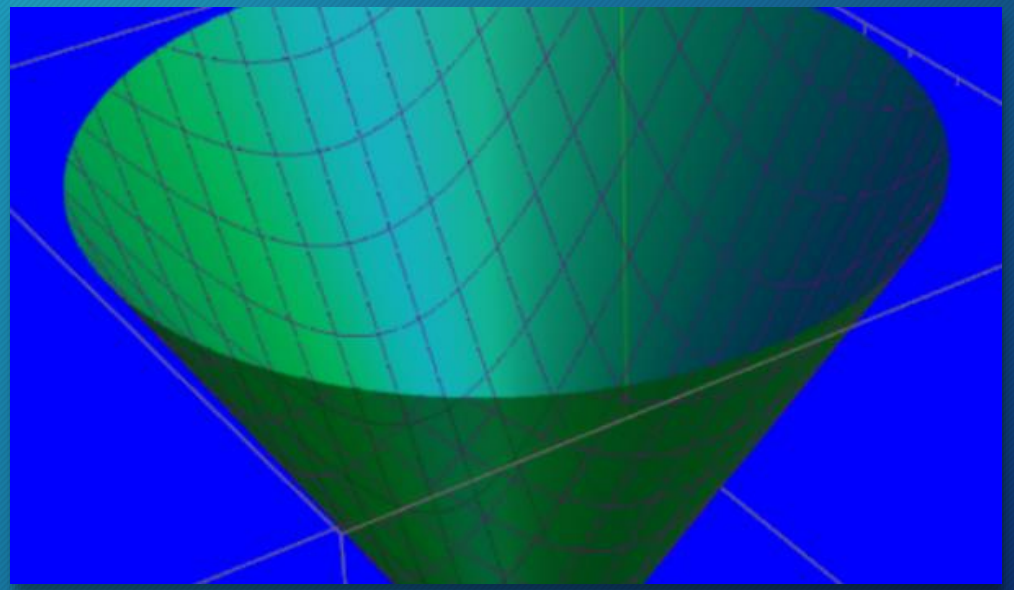
Example Four

```
cone2 = ParametricPlot3D[{r Cos[ϕ], r Sin[ϕ], r Cot[π / 6]}, {ϕ, 0, 2 π},
  {r, 0, 3 }, Mesh → 16, MeshStyle → Directive[Thin, Purple],
 xclusionsStyle → {None, Red}, ImageSize → Large, PlotPoints → 64,
 lotStyle → Directive[Pink, Opacity[0.7], Specularity[White, 20]]]
```



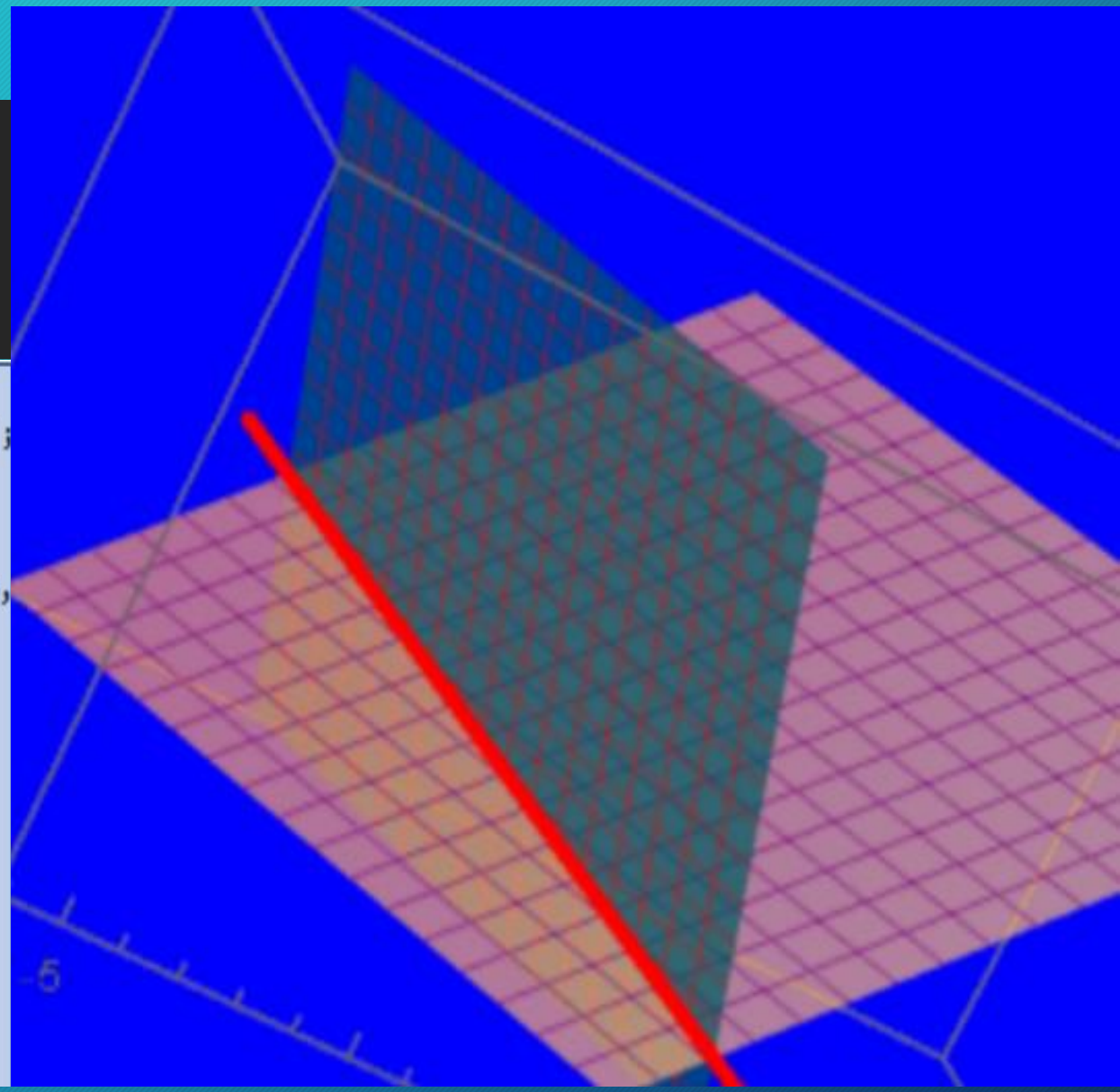
Combining & Cutting





Example Six

```
v1 = {2, 1, 3}; v2 = {1, -1, 1}; vL = Cross[v1, v2];
plotStyle[color_RGBColor] := Directive[color, Opacity[0.7], Specularity[White, 20]];
l1 = ParametricPlot3D[{2 + vL[[1]] t, 3 + vL[[2]] t, 1 + vL[[3]] t}, {t, -2, 1},
   PlotStyle → Directive[Red, Thickness[0.01]]];
p1 = ParametricPlot3D[{x1, x2, 1 / 3 (10 - x2 - 2 x1)}, {x1, -5, 5}, {x2, 0, 10}, Mesh → 16,
   MeshStyle → Directive[Opacity[.8], Thin, Red], ExclusionsStyle → {None, Red},
   ImageSize → Large, PlotPoints → 64, PlotStyle → Evaluate[plotStyle[Cyan]],
   SphericalRegion → True];
p2 = ParametricPlot3D[{x1, x2, x2 - x1}, {x1, -5, 5}, {x2, 0, 10}, Mesh → 16,
   MeshStyle → Directive[Thin, Purple],
   ExclusionsStyle → {None, Red}, ImageSize → Large, PlotPoints → 64,
   PlotStyle → Evaluate[plotStyle[Pink]],
   SphericalRegion → True];
Show[l1, p1, p2, Background → Blue]
```



Example Seven

```
Solve[{2 x1 + x2 + 3 x3 == 10, x1 - x2 + x3 == 0, x1 + x2 + x3 == 6}];
plotStyle[color_RGBColor] := Directive[color, Opacity[0.7], Specularity[White, 20]];
point1 = ParametricPlot3D[{2, 3, 1}, {x1, 1, 2}, PlotStyle → Directive[Red, Thickness[0.02]]];
p1 = ParametricPlot3D[{x1, x2, 1 / 3 (10 - x2 - 2 x1)}, {x1, 0, 5}, {x2, 0, 5}, Mesh → 16,
    MeshStyle → Directive[Opacity[.8], Thin, Red], ExclusionsStyle → {None, Red},
    ImageSize → Large, PlotPoints → 64, PlotStyle → Evaluate[plotStyle[Cyan]],
    SphericalRegion → True];
p2 = ParametricPlot3D[{x1, x2, x2 - x1}, {x1, 0, 5}, {x2, 0, 5}, Mesh → 16,
   MeshStyle → Directive[Thin, Purple],
   ExclusionsStyle → {None, Red}, ImageSize → Large, PlotPoints → 64,
   PlotStyle → Evaluate[plotStyle[Pink]],
   SphericalRegion → True];
p3 = ParametricPlot3D[{x1, x2, 6 - x2 - x1}, {x1, 0, 5}, {x2, 0, 5}, Mesh → 16,
   MeshStyle → Directive[Thin, Purple],
   ExclusionsStyle → {None, Red}, ImageSize → Large, PlotPoints → 64,
   PlotStyle → Evaluate[plotStyle[Green]],
   SphericalRegion → True];
Show[point1, p1, p2, p3, Background → Blue]
```