UNIVERSIDAD NACIONAL DE SAN AGUSTÍN
COMPUTACIÓN GRÁFICA
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Ejercicios 1.6

Escriba los procedimientos inp_to_ndc, ndc_to_user, user_to_ndc y ndc_to_dc, que transforman datos entre los diferentes sistemas de coordenadas, como se muestra en la Figura 1.3. Repita el ejercicio asumiendo que el intervalo de variación del sistema NDC va de:

(i) -1 a +1 (coordenadas normalizadas centradas)

inp_to_ndc

$$ndcx = \frac{dcx}{ndh-1}$$
$$ndcy = \frac{dcy}{ndv-1}$$

```
inp_to_ndc(double dcx, double dcy){
  ndcx = dcx / ndh-1;
  ndcy = dcy / ndv-1;
  return  ndcx,ndcy;
}
```

ndc_to_user

$$x = ndcx\,(xmax - xmin) + xmin$$
$$x = ndcx\,(1 - (-1)) + (-1)$$
$$x = ndcx\,(2) - 1$$

$$y = ndcy\,(ymax - ymin) + ymin$$
$$y = ndcy\,(1 - (-1)) + (-1)$$
$$y = ndcy\,(2) - 1$$

```
ndc_to_user(double ndcx, double ndcy){
  x= ndcx*2-1;
  y= ndcy*2-1;
  return x,y;
}
```

user_to_ndc

$$ndcx = \frac{(x-xmin)}{(xmax-xmin)}$$
$$ndcx = \frac{(x-(-1))}{(1-(-1))}$$
$$ndcx = \frac{(x+1)}{2}$$

$$ndcy = \frac{(y-ymin)}{(ymax-ymin)}$$
$$ndcx = \frac{(y-(-1))}{(1-(-1))}$$
$$ndcx = \frac{(y+1)}{2}$$

```
user_to_ndc(double x, double y){
  ndcx=(x+1)/2;
  ndcy=(y+1)/2;
  return ndcx,ndcy;
}
```

ndc_to_dc

$$dcx = round(ndcx * (ndh - 1))$$
$$dcy = round(ndcy * (ndv - 1))$$

```
ndc_to_dc(double ndcx, doublendcy){
  dcx=round(ndcx*(ndh-1));
  dcy=round(ndcy*(ndv-1));
  return dcx,dcy;
}
```

(ii) 0 a 100

inp_to_ndc

$$ndcx = \frac{dcx}{ndh-1}$$
$$ndcy = \frac{dcy}{ndv-1}$$

```
inp_to_ndc(double , double){
  ndcx = dcx / ndh-1;
  ndcy = dcy / ndv-1;
  return  ndcx,ndcy;
```

```
}
```

ndc_to_user

$$x = ndcx\,(xmax - xmin) + xmin$$
$$x = ndcx\,(100 - (0)) + (0)$$
$$x = ndcx\,(100)$$

$$y = ndcy\,(ymax - ymin) + ymin$$
$$y = ndcy\,(100 - (0)) + (0)$$
$$y = ndcy\,(100)$$

```
ndc_to_user(double , double){
  x= ndcx*100;
  y= ndcy*100;
  return x,y;
}
```

user_to_ndc

$$ndcx = \frac{(x - xmin)}{(xmax - xmin)}$$
$$ndcx = \frac{(x - (0))}{(100 - (0))}$$
$$ndcx = \frac{x}{100}$$

$$ndcy = \frac{(y - ymin)}{(ymax - ymin)}$$
$$ndcx = \frac{(y - (0))}{(100 - (0))}$$
$$ndcx = \frac{y}{100}$$

```
user_to_ndc(double , double)
{
  ndcx=x/100;
  ndcy=y/100;
  return ndcx,ndcy;
}
```

ndc_to_dc

$$dcx = round(ndcx * (ndh - 1))$$
$$dcy = round(ndcy * (ndv - 1))$$

```
ndc_to_dc(double , double){
  dcx=round(ndcx*(ndh-1));
  dcy=round(ndcy*(ndv-1));
  return dcx,dcy;
}
```