Laboratori de Gràfics

Sessió 5

Interpolació per fragment

- Tot el que s'interpola per cada fragment (coords x,y,z, coords de textura s,t, out's definits per l'usuari) es calcula al **centre del pixel** corresponent. Per tant:

fract(glFragCoord.x) serà 0.5

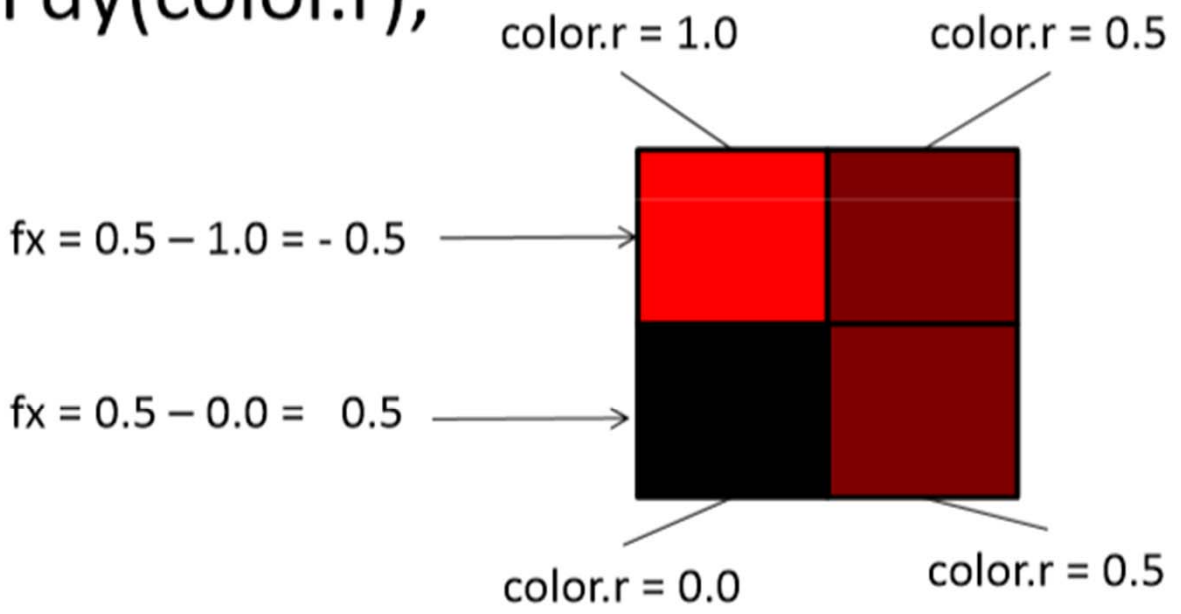
fract(glFragCoord.y) serà 0.5

- En algunes versions de GLSL, és pot eliminar aquest offset redeclarant gl_FragCoord

layout(pixel_center_integer) **in vec4** gl_FragCoord;

dFdx, dFdy - exemple

```
float fx = dFdx(color.r);
float fy = dFdy(color.r);
```



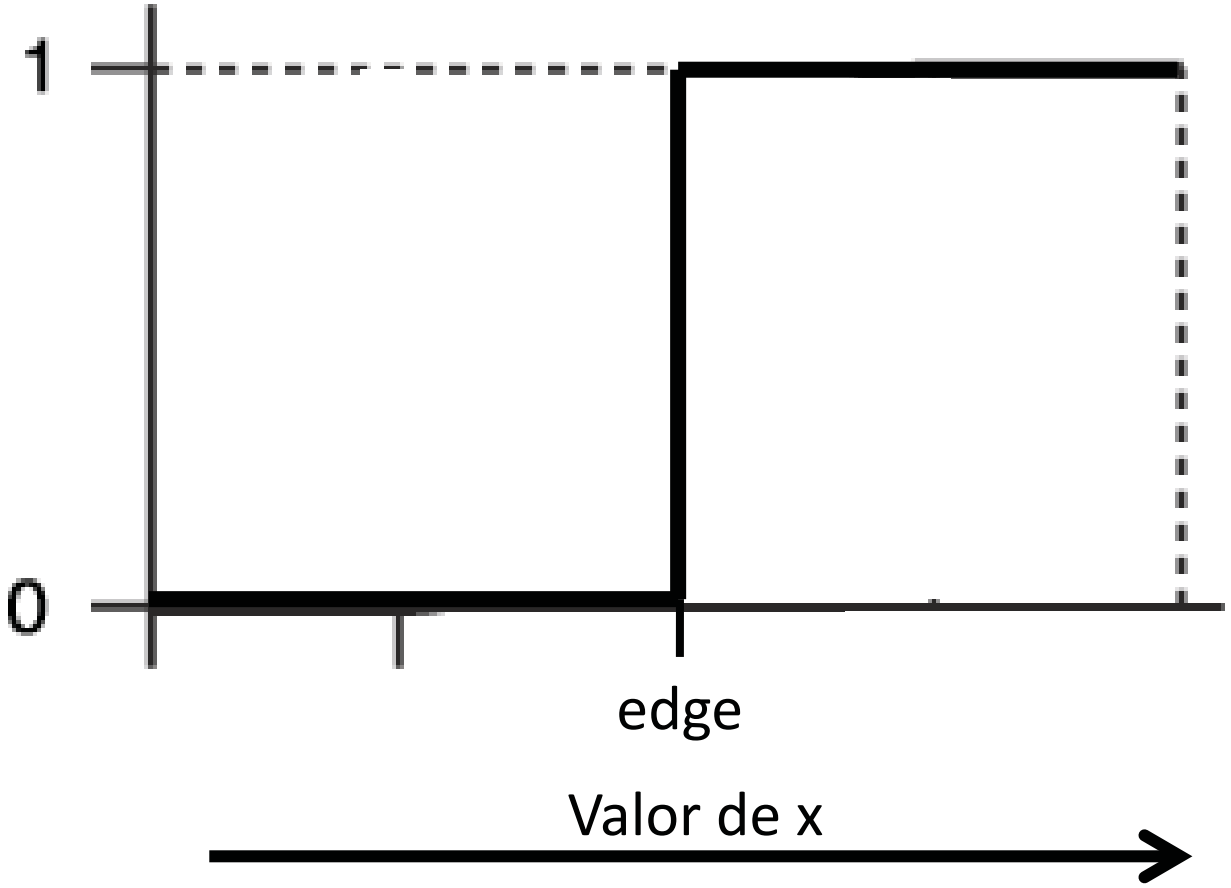
fy = 1.0 – 0.0 = 1.0

fy = 0.5 – 0.5 = 0.0

Funcions step, smoothstep

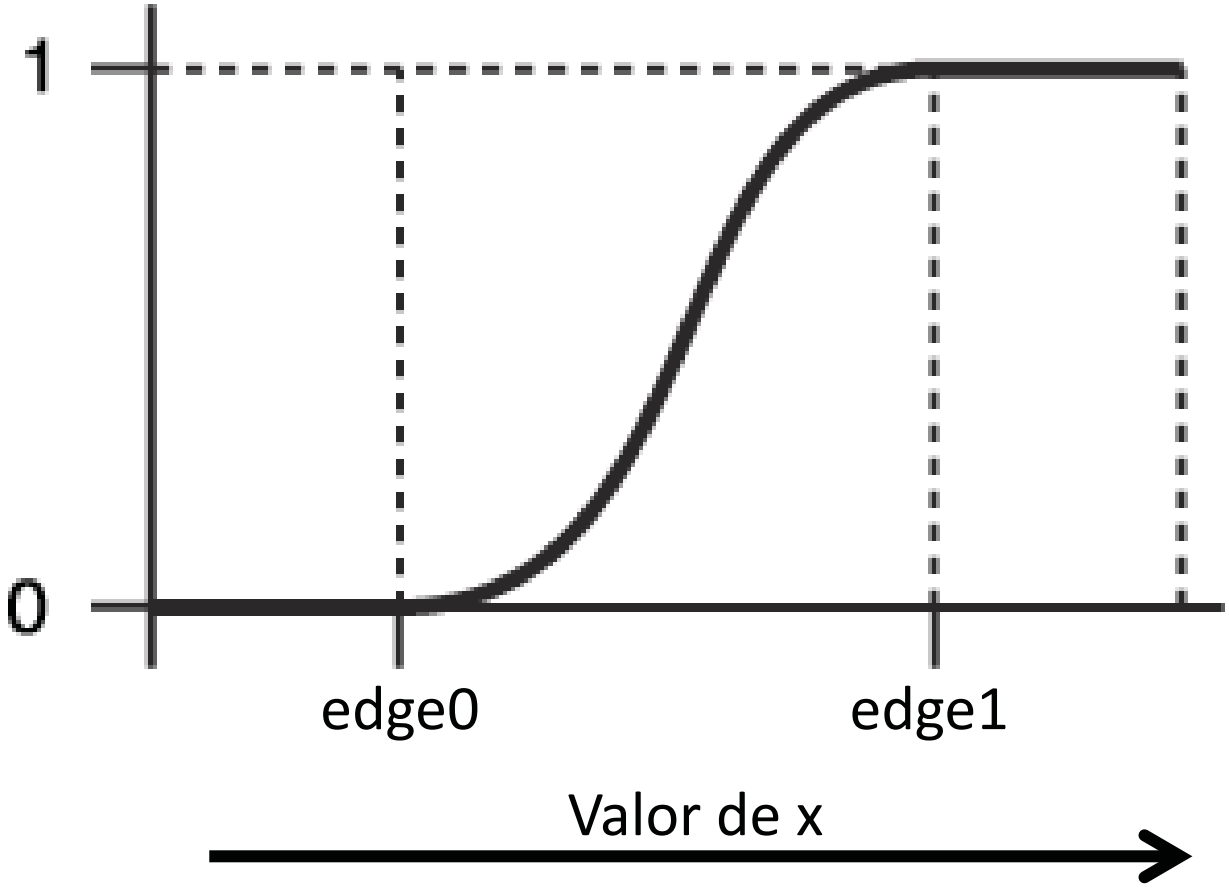
float step(**float** edge, **float** x)

$$\begin{cases} 0 & \text{if } x<edge \\ 1 & \text{otherwise} \end{cases}$$



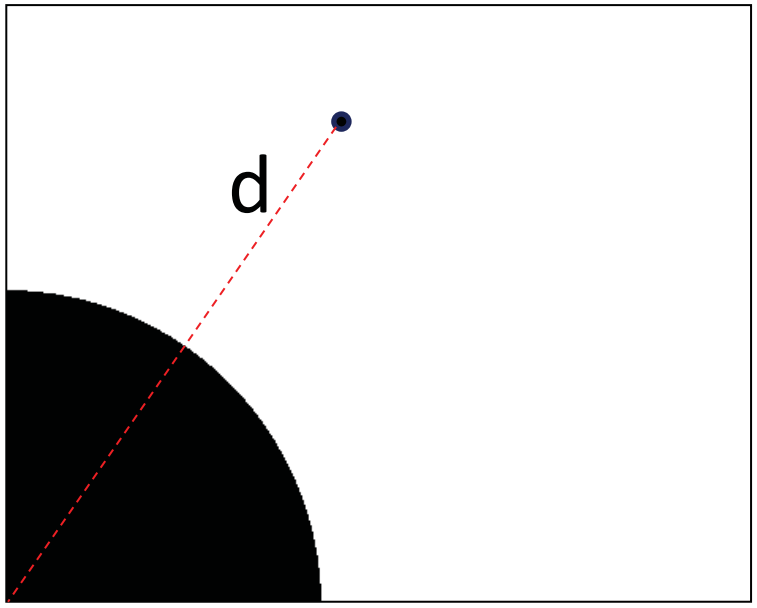
Funcions step, smoothstep

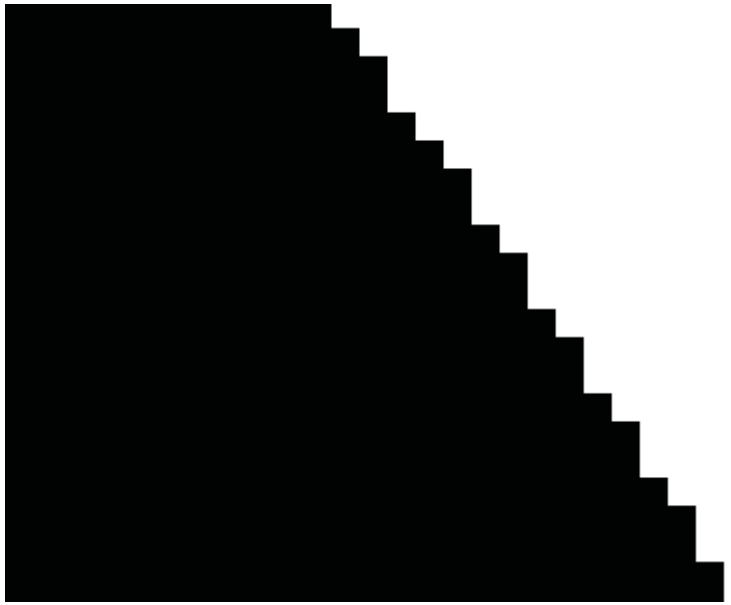
float smoothstep(**float** edge0, **float** edge1, **float** x)



Exemple - step

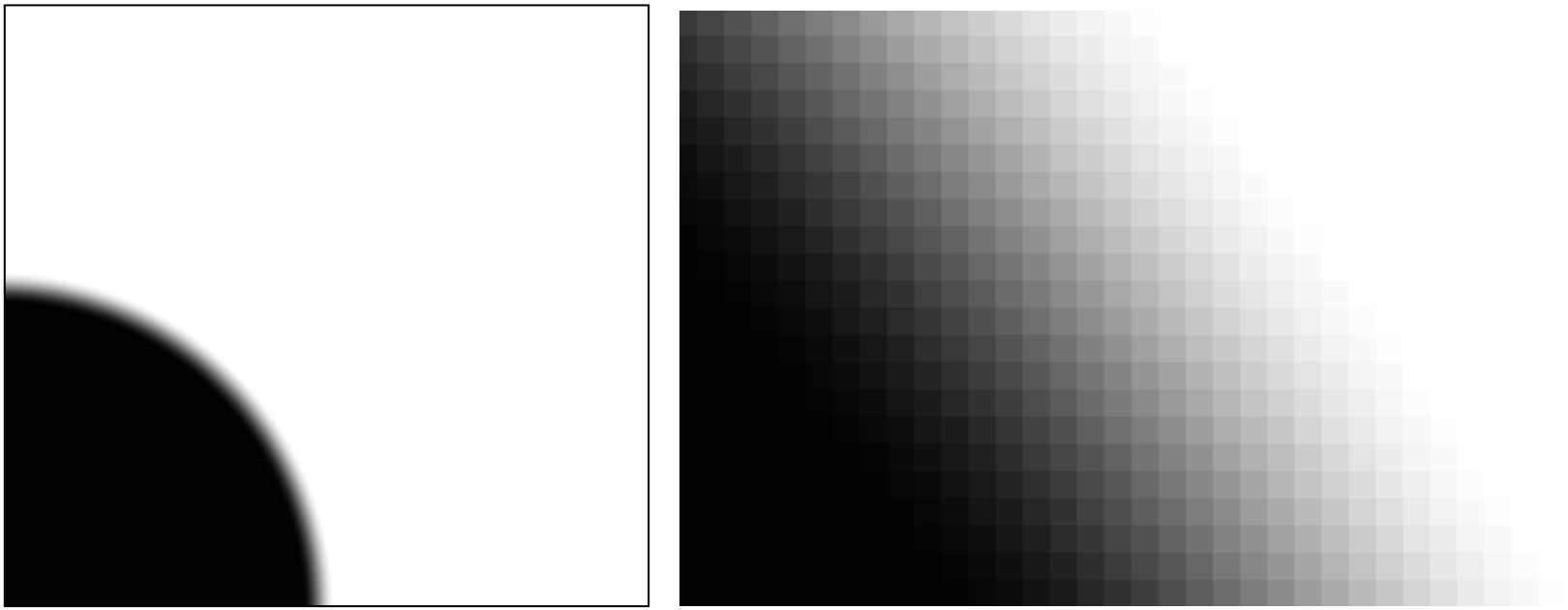
```
void main() {
  float d = length(gl_FragCoord.xy);
  gl_FragColor = vec4(step(200, d));
}
```





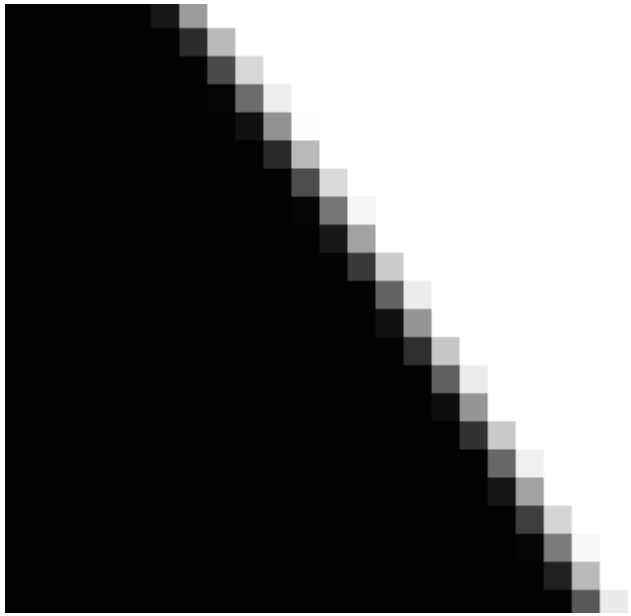
Exemple - step

```
void main() {
  float d = length(gl_FragCoord.xy);
  gl_FragColor = vec4(smoothtep(200-10,200+10, d));
}
```



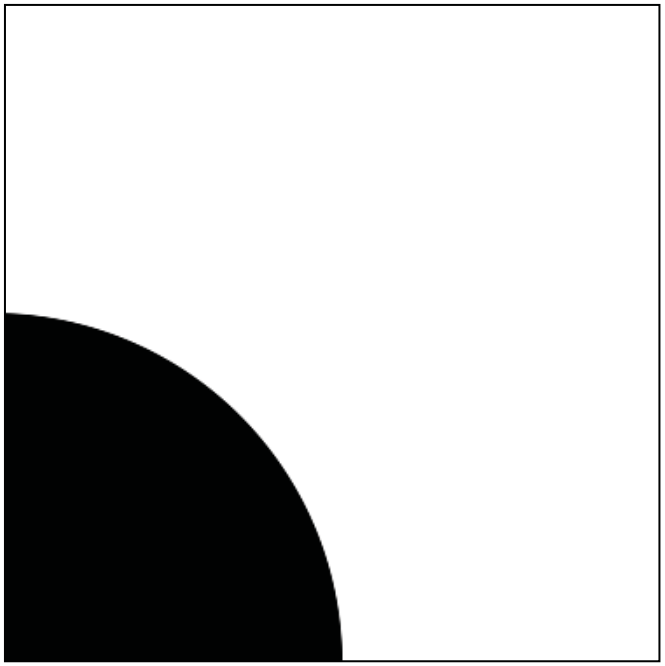
Exemple - smoothstep

```
void main() {
  float d = length(gl_FragCoord.xy);
  gl_FragColor = vec4(smoothtep(200-1,200+1, d));
}
```



Exemple - smoothstep

```
void main() {
  float d = length(gl_FragCoord.xy);
  gl_FragColor =vec4(smoothtep(200-0.5,200+0.5, d));
}
```

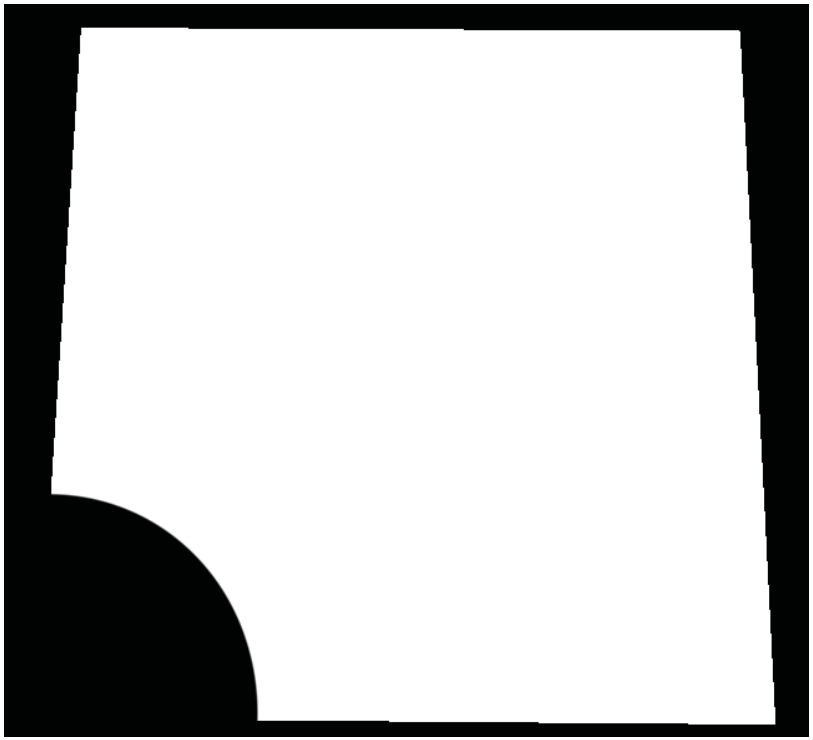


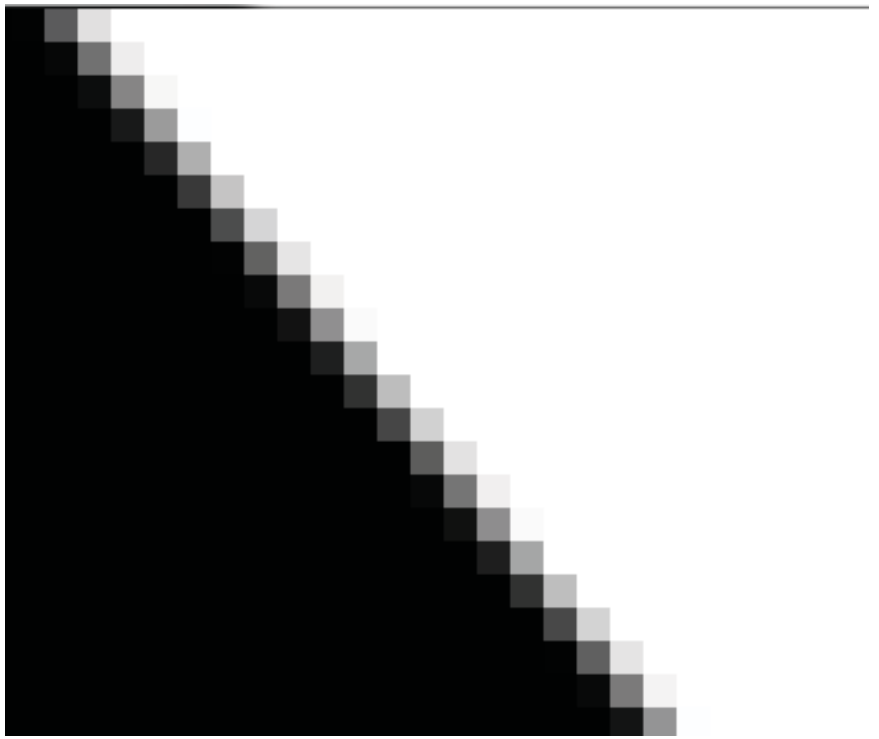
Exemple 2 - smoothstep

```
void main() {
  float d = length(vtexCoord);
  const float r = 0.3;
  gl_FragColor = vec4(smoothstep(r-0.5, r+0.5, d));
}
```

Exemple 2 – smoothstep + dFdx,dFdy

```
float width = 0.5*length(vec2(dFdx(d), dFdy(d)));
gl_FragColor=vec4(smoothstep(r-width, r+width, d));
```





aastep (*)

```
float aastep(float threshold, float x)
{
  float width = 0.7*length(vec2(dFdx(x), dFdy(x)));
  return smoothstep(threshold-width, threshold+width, x);
}
```

(*) Patrick Cozzi, Christophe Riccio (Eds.) *OpenGL Insights*, CRC Press, 2012