CSE216 Programming Abstractions
Picture Language

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To Use Graphics in Cygwin

- Check if Graphics package is installed

```
$ opam list
# Packages matching: installed
# Name                    # Installed      # Synopsis
base-bigarray             base
...
graphics                  5.1.1            The OCaml graphics library
ocaml                     4.11.1           The OCaml compiler (virtual package)
...
```

- Install Graphics package if it is not installed

```
$ opam install graphics
```

- Run Ocaml with -I (include) option

```
$ ocaml -I $(ocamlfind query graphics)
```
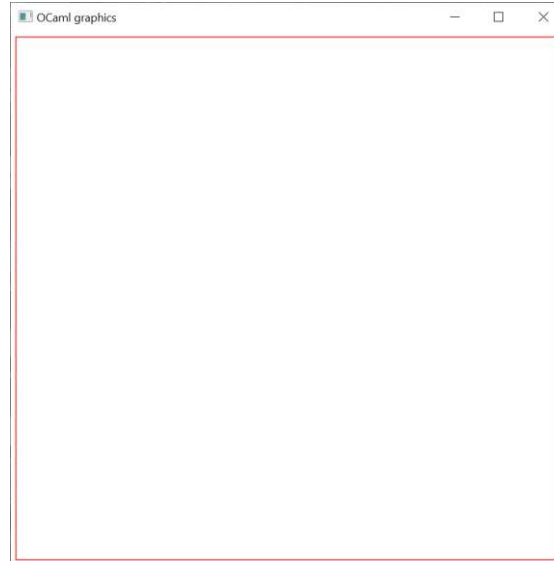
- If ocamlfind is not installed, install it using

```
$ opam install ocamlfind
```
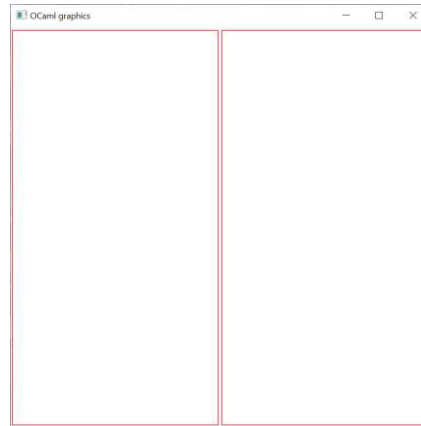
Simple transform on painters

- **Draw the base_painter**

```
let p0 = base_painter
let _ = draw p0 frame_g
```

Simple transform on painters

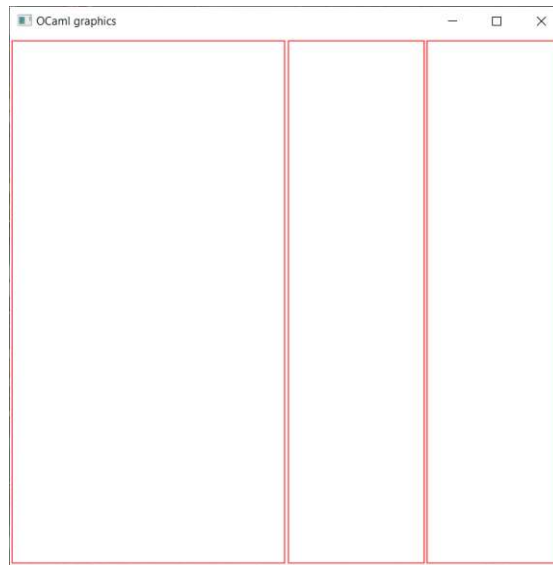- Draw the following using beside


```
let beside painter_l painter_r =
    let paint_left  = tf_painter painter_l (0.,0.)  (0.5,0.) (0.,1.)  in
    let paint_right = tf_painter painter_r (0.5,0.) (1.,0.)  (0.5,1.) in
    fun frame ->
        paint_left  frame;
        paint_right frame

let p1 =
let _ = draw p1 frame_g
```
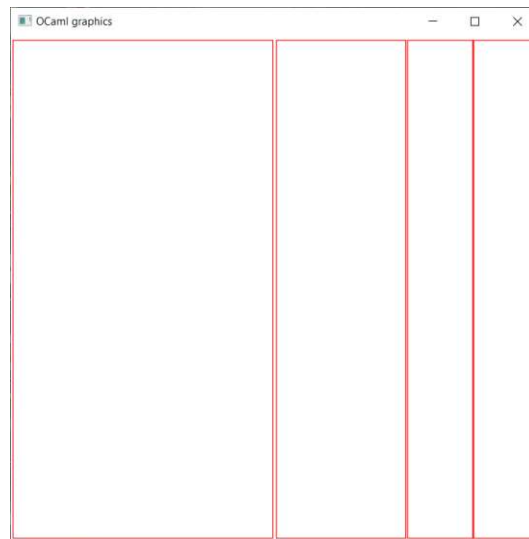
Simple transform on painters

■ Draw the following using beside


```
let p2 =
let _ = draw p2 frame_g
```
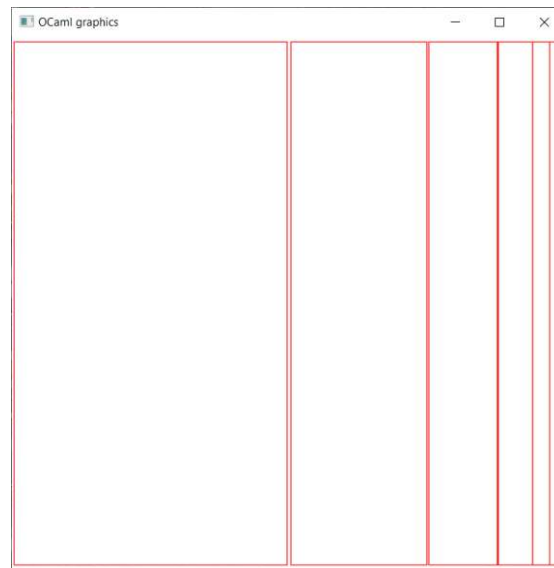
Simple transform on painters

- Draw the following using beside


```
let p3 =
let _ = draw p3 frame_g
```

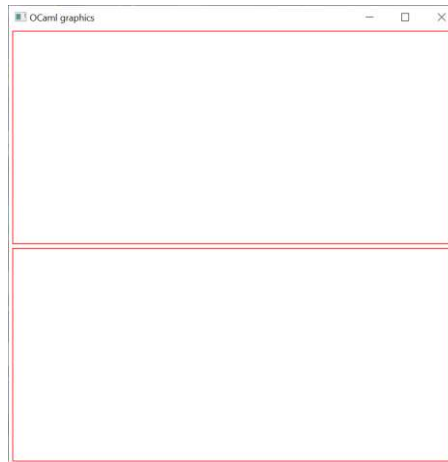# Simple transform on painters

- Implement besides


```
let rec besides n =

let _ = draw (besides 8) frame_g
```

Simple transform on painters

- Implement below

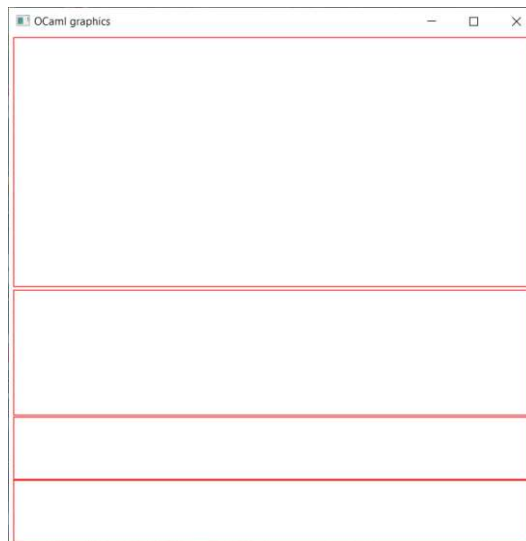```
let below painter_t painter_b =
    let paint_top   =
    let paint_bottom =
    fun frame ->

let p1 = below p0 p0
let _ = draw p1 frame_g
```
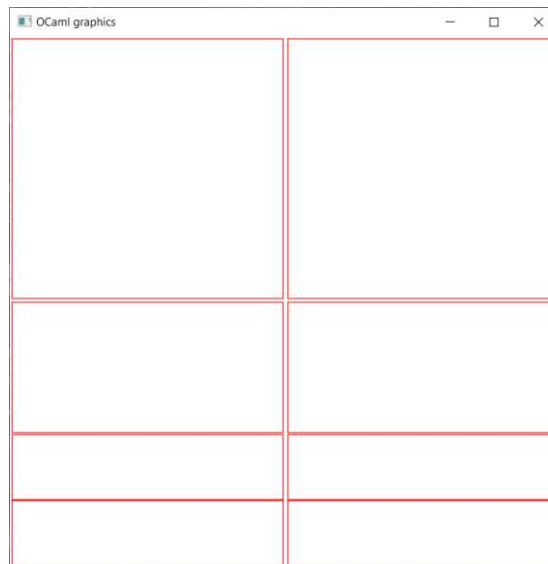
# Simple transform on painters

- Draw the following using below



```
let p2 =
let p3 =
let _ = draw p3 frame_g
```
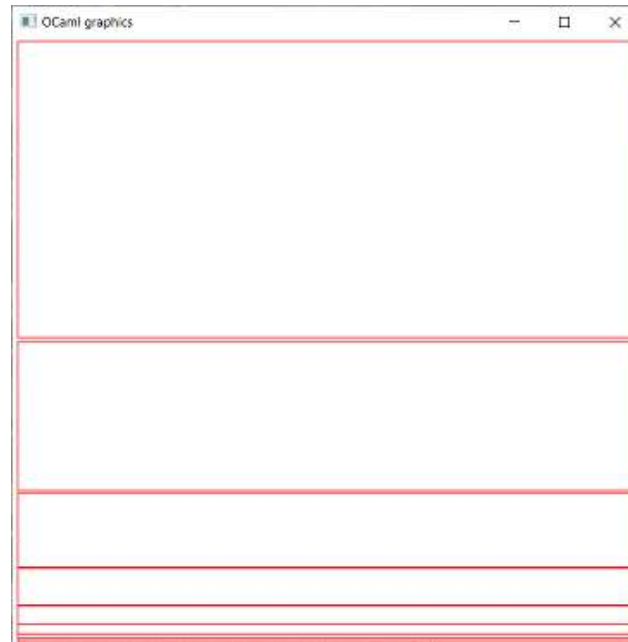
# Simple transform on painters

- Draw the following using below and beside



```
let p4 =
let _ = draw p4 frame_g
```

Simple transform on painters

- Implement belows


```
let rec belows n =

let _ = draw (belows 8) frame_g
```