

```
module word_mixcolumn(in,outx,outy);
```

```
input [31:0] in;
```

```
output [31:0] outx;
```

```
output [31:0] outy;
```

```
reg [31:0] outx;
```

```
reg [31:0] outy;
```

```
reg [7:0] a;
```

```
reg [7:0] b;
```

```
reg [7:0] c;
```

```
reg [7:0] d;
```

```
wire [7:0] x1;
```

```
wire [7:0] x2;
```

```
wire [7:0] x3;
```

```
wire [7:0] x4;
```

```
wire [7:0] y1;
```

```
wire [7:0] y2;
```

```
wire [7:0] y3;
```

```
wire [7:0] y4;
```

```
byte_mixcolumn bm1 (.a(a), .b(b), .c(c), .d(d), .outx(x1), .outy(y1));
```

```
byte_mixcolumn bm2 (.a(b), .b(c), .c(d), .d(a), .outx(x2), .outy(y2));
```

```
byte_mixcolumn bm3 (.a(c), .b(d), .c(a), .d(b), .outx(x3), .outy(y3));
```

```
byte_mixcolumn bm4 (.a(d), .b(a), .c(b), .d(c), .outx(x4), .outy(y4));
```

```
reg[31:0] in_var;  
reg[31:0] outx_var,outy_var;
```

```
//split:
```

```
always @( in)
```

```
begin
```

```
    in_var=in;
```

```
    a = (in_var[31:24]);
```

```
    b = (in_var[23:16]);
```

```
    c = (in_var[15:8]);
```

```
    d = (in_var[7:0]);
```

```
end
```

```
//mix:
```

```
always @( x1 or x2 or x3 or x4 or y1 or y2 or y3 or y4)
```

```
begin
```

```
    outx_var[31:24]=x1;
```

```
    outx_var[23:16]=x2;
```

```
    outx_var[15:8]=x3;
```

```
    outx_var[7:0]=x4;
```

```
    outy_var[31:24]=y1;
```

```
    outy_var[23:16]=y2;
```

```
    outy_var[15:8]=y3;
```

```
    outy_var[7:0]=y4;
```

```
    outx = (outx_var);
```

```
    outy = (outy_var);
```

```
end
```

```
endmodule
```