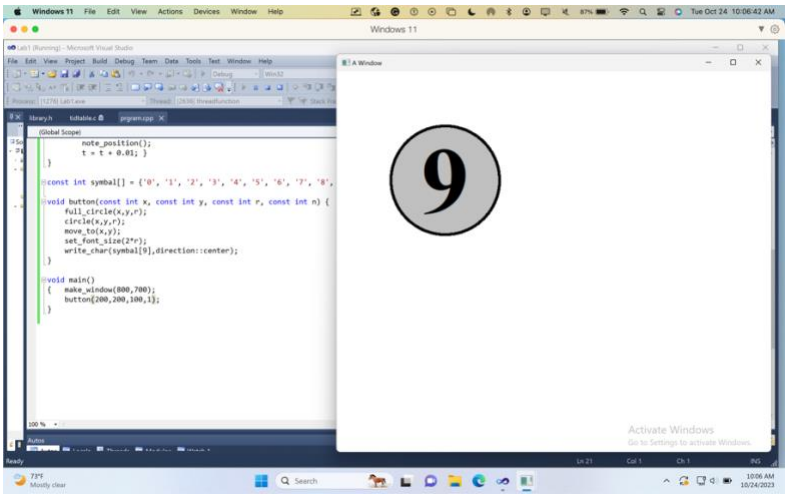
Lab #8 - Calculator

ECE 118 – Section R/RC
Lab on Wednesday at 5:05
Sloan Atkins

1. A Button

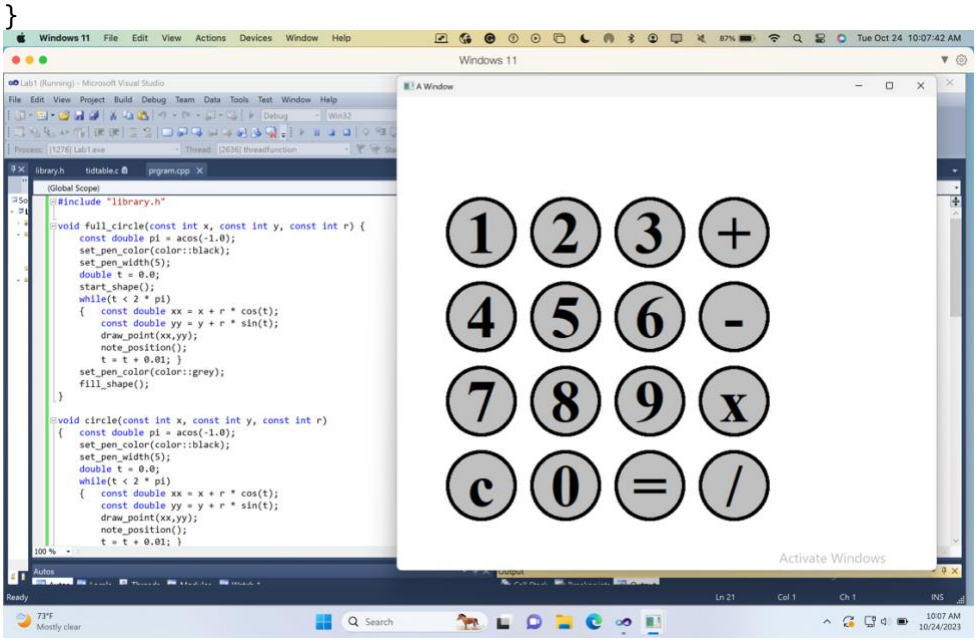
```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}

const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[9],direction::center);
}

void main()
{     make_window(800,700);
    button(200,200,100,1); }
```



2. Some Buttons

```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}
```

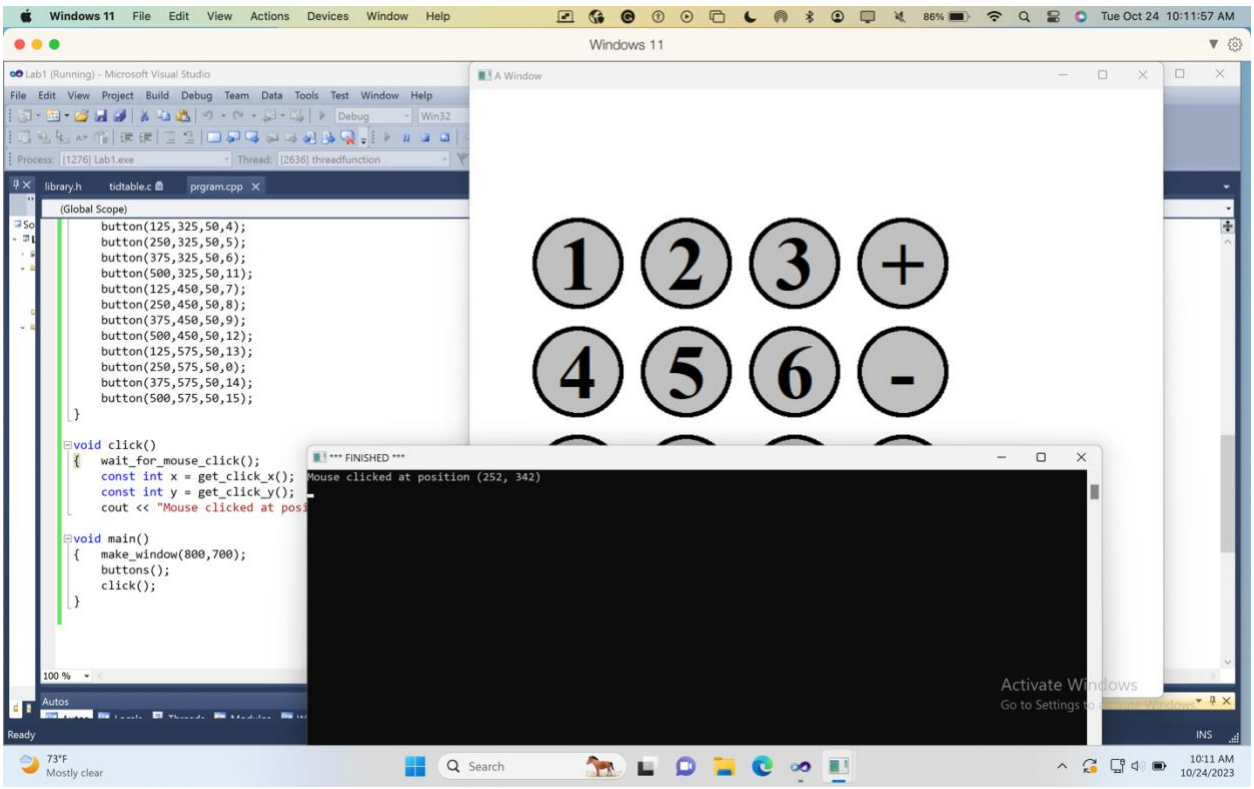
```
const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[n],direction::center);
}

void buttons()
{      button(125,200,50,1);
       button(250,200,50,2);
       button(375,200,50,3);
       button(500,200,50,10);
       button(125,325,50,4);
       button(250,325,50,5);
       button(375,325,50,6);
       button(500,325,50,11);
       button(125,450,50,7);
       button(250,450,50,8);
       button(375,450,50,9);
       button(500,450,50,12);
       button(125,575,50,13);
       button(250,575,50,0);
       button(375,575,50,14);
       button(500,575,50,15);
}

void main()
{      make_window(800,700);
    buttons();
}
```



3. Clicking

```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}

const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[n],direction::center);
}

void buttons()
{     button(125,200,50,1);
      button(250,200,50,2);
      button(375,200,50,3);
      button(500,200,50,10);
      button(125,325,50,4);
      button(250,325,50,5);
      button(375,325,50,6);
```

```
        button(500,325,50,11);
        button(125,450,50,7);
        button(250,450,50,8);
        button(375,450,50,9);
        button(500,450,50,12);
        button(125,575,50,13);
        button(250,575,50,0);
        button(375,575,50,14);
        button(500,575,50,15);
}

void click()
{       wait_for_mouse_click();
        const int x = get_click_x();
        const int y = get_click_y();
        cout << "Mouse clicked at position (" << x << ", " << y << ")\n"; }

void main()
{       make_window(800,700);
    buttons();
        click();
}
```

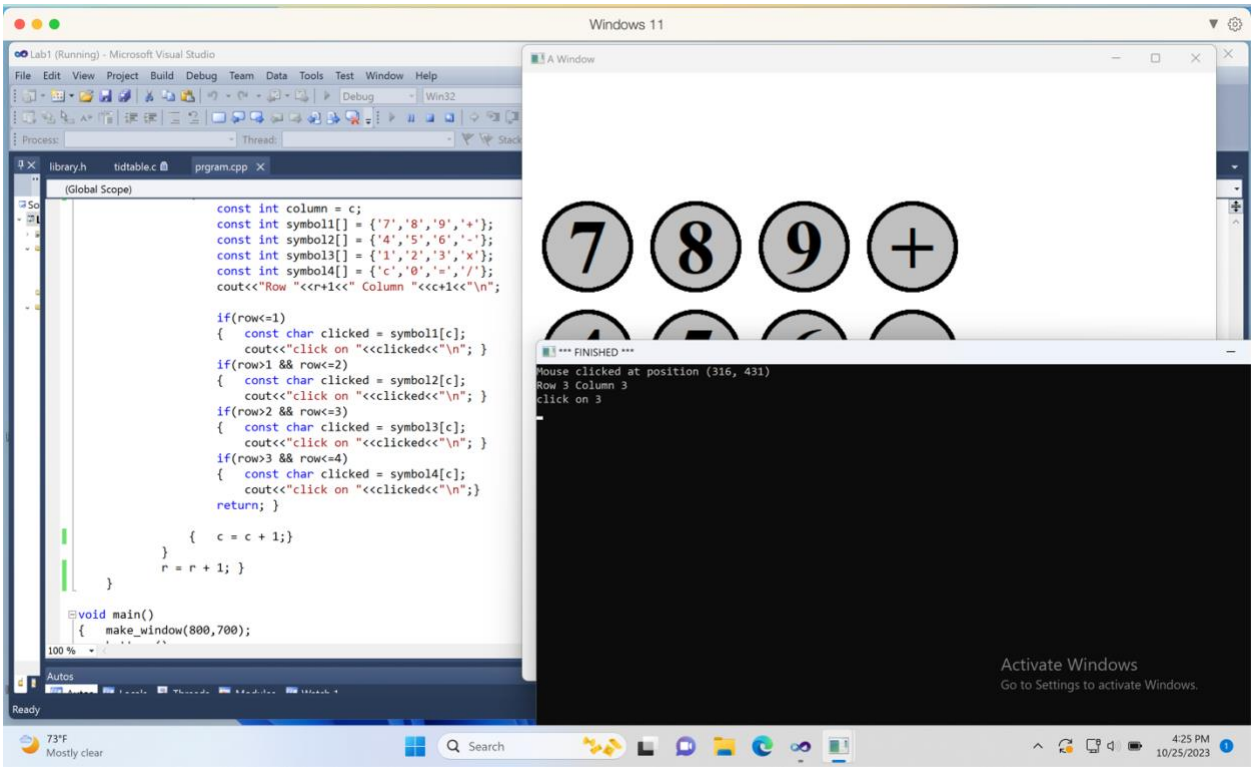


4. What did you click on?

```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}

const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[n],direction::center);
}

void buttons()
{     button(75,200,50,7);
      button(200,200,50,8);
      button(325,200,50,9);
      button(450,200,50,10);
      button(75,325,50,4);
      button(200,325,50,5);
      button(325,325,50,6);
```

```
	button(450,325,50,11);
	button(75,450,50,1);
	button(200,450,50,2);
	button(325,450,50,3);
	button(450,450,50,12);
	button(75,575,50,13);
	button(200,575,50,0);
	button(325,575,50,14);
	button(450,575,50,15);
}

void click()
{	wait_for_mouse_click();
	const int xx = get_click_x();
	const int yy = get_click_y();
	cout << "Mouse clicked at position (" << xx << ", " << yy << ")\n";
	int r = 0;
		while(r < 4)
		{	int c = 0;
			while(c < 5)
			{	if(xx >= c*125+25 && xx <= c*125+125 && yy >= r*125+150
&& yy <= r*125+250)
				{	const int row = r+1;
					const int column = c;
					const int symbol1[] = {'7','8','9','+'};
					const int symbol2[] = {'4','5','6','-'};
					const int symbol3[] = {'1','2','3','x'};
					const int symbol4[] = {'c','0','=','/'};
					cout<<"Row "<<r+1<<" Column "<<c+1<<"\n";

					if(row<=1)
					{	const char clicked = symbol1[c];
						cout<<"click on "<<clicked<<"\n"; }
					if(row>1 && row<=2)
					{	const char clicked = symbol2[c];
						cout<<"click on "<<clicked<<"\n"; }
					if(row>2 && row<=3)
					{	const char clicked = symbol3[c];
						cout<<"click on "<<clicked<<"\n"; }
					if(row>3 && row<=4)
					{	const char clicked = symbol4[c];
						cout<<"click on "<<clicked<<"\n";}
					return; }

				{	c = c + 1;}
			}
			r = r + 1; }
	}

void main()
{	make_window(800,700);
    buttons();
```

```
        click();
}
```



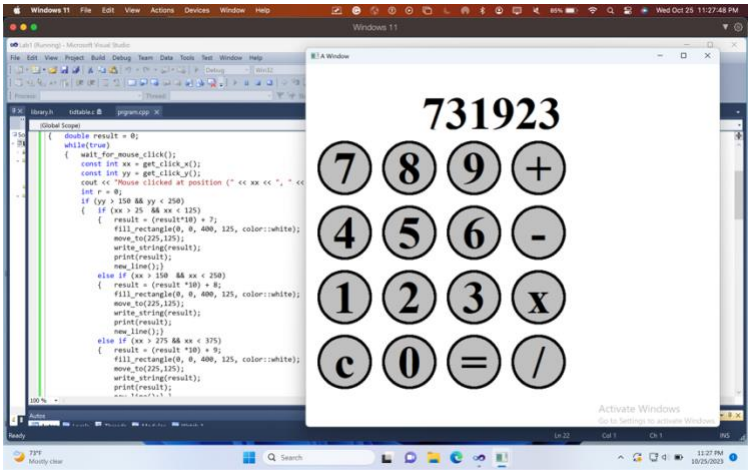
5. Almost a calculator

```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
```

```
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}

const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[n],direction::center);
}

void buttons()
{     button(75,200,50,7);
      button(200,200,50,8);
      button(325,200,50,9);
      button(450,200,50,10);
      button(75,325,50,4);
      button(200,325,50,5);
      button(325,325,50,6);
      button(450,325,50,11);
      button(75,450,50,1);
      button(200,450,50,2);
      button(325,450,50,3);
      button(450,450,50,12);
      button(75,575,50,13);
      button(200,575,50,0);
      button(325,575,50,14);
      button(450,575,50,15);
}

int clicking(double const x,double const y)
{     double result = 0;
      while(true)
      {     wait_for_mouse_click();
            const int xx = get_click_x();
            const int yy = get_click_y();
            cout << "Mouse clicked at position (" << xx << ", " << yy << ")\n";
            int r = 0;
            if (yy > 150 && yy < 250)
            {     if (xx > 25  && xx < 125)
                  {     result = (result*10) + 7;
```

```
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 150  && xx < 250)
        {       result = (result *10) + 8;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 275 && xx < 375)
        {       result = (result *10) + 9;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();} }

if (yy > 275 && yy < 375)
{       if (xx > 25  && xx < 125)
        {       result = (result*10) + 4;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 150  && xx < 250)
        {       result = (result *10) + 5;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 275 && xx < 375)
        {       result = (result *10) + 6;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();} }

if (yy > 400 && yy < 500)
{       if (xx > 25  && xx < 125)
        {       result = (result*10) + 1;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(225,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 150  && xx < 250)
```

```
                  {     result = (result *10) + 2;
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(225,125);
                        write_string(result);
                        print(result);
                        new_line();}
                  else if (xx > 275 && xx < 375)
                  {     result = (result *10) + 3;
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(225,125);
                        write_string(result);
                        print(result);
                        new_line();} }

            if (yy > 525 && yy < 625)
            {     if (xx > 25  && xx < 125)
                  {     result = 0;
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(225,125);
                        write_string(result);
                        print(result);
                        new_line(); }
                  else if (xx > 150  && xx < 250)
                  {     result = (result *10);
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(225,125);
                        write_string(result);
                        print(result);
                        new_line(); } } }
      return result;
}

void main()
{     make_window(800,700);
      buttons();
    clicking(400,70);
}
```



6. Finally

```
#include "library.h"

void full_circle(const int x, const int y, const int r) {
    const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
    double t = 0.0;
    start_shape();
    while(t < 2 * pi)
      {     const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
    set_pen_color(color::grey);
    fill_shape();
}

void circle(const int x, const int y, const int r)
{     const double pi = acos(-1.0);
    set_pen_color(color::black);
    set_pen_width(5);
      double t = 0.0;
    while(t < 2 * pi)
    { const double xx = x + r * cos(t);
            const double yy = y + r * sin(t);
            draw_point(xx,yy);
            note_position();
            t = t + 0.01; }
}

const int symbal[] = {'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '+', '-',
'x','c', '=', '/'};

void button(const int x, const int y, const int r, const int n) {
    full_circle(x,y,r);
    circle(x,y,r);
    move_to(x,y);
    set_font_size(2*r);
    write_char(symbal[n],direction::center);
}

void buttons()
{     button(75,200,50,7);
      button(200,200,50,8);
      button(325,200,50,9);
      button(450,200,50,10);
      button(75,325,50,4);
      button(200,325,50,5);
      button(325,325,50,6);
```

```
	button(450,325,50,11);
	button(75,450,50,1);
	button(200,450,50,2);
	button(325,450,50,3);
	button(450,450,50,12);
	button(75,575,50,13);
	button(200,575,50,0);
	button(325,575,50,14);
	button(450,575,50,15);
}

int clicking(double const x,double const y)
{	double result = 0;
	while(true)
	{	wait_for_mouse_click();
		const int xx = get_click_x();
		const int yy = get_click_y();
		cout << "Mouse clicked at position (" << xx << ", " << yy << ")\n";
		int r = 0;
		if (yy > 150 && yy < 250)
		{	if (xx > 25  && xx < 125)
			{	result = (result*10) + 7;
				fill_rectangle(0, 0, 400, 125, color::white);
				move_to(300,125);
				write_string(result);
				print(result);
				new_line();}
			else if (xx > 150  && xx < 250)
			{	result = (result *10) + 8;
				fill_rectangle(0, 0, 400, 125, color::white);
				move_to(300,125);
				write_string(result);
				print(result);
				new_line();}
			else if (xx > 275 && xx < 375)
			{	result = (result *10) + 9;
				fill_rectangle(0, 0, 400, 125, color::white);
				move_to(300,125);
				write_string(result);
				print(result);
				new_line();}
			else if (xx > 400 && xx < 500)
			{	result = result + clicking(x,y);
				fill_rectangle(0, 0, 400, 125, color::white);
				move_to(300,125);
				write_string(result);
				print(result);
				new_line();} }

		if (yy > 275 && yy < 375)
		{	if (xx > 25  && xx < 125)
			{	result = (result*10) + 4;
```

```
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 150  && xx < 250)
        {       result = (result *10) + 5;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 275 && xx < 375)
        {       result = (result *10) + 6;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 400 && xx < 500)
        {       result = result - clicking(x,y);
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();} }

if (yy > 400 && yy < 500)
{       if (xx > 25  && xx < 125)
        {       result = (result*10) + 1;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 150  && xx < 250)
        {       result = (result *10) + 2;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 275 && xx < 375)
        {       result = (result *10) + 3;
                fill_rectangle(0, 0, 400, 125, color::white);
                move_to(300,125);
                write_string(result);
                print(result);
                new_line();}
        else if (xx > 400 && xx < 500)
        {       result = result * clicking(x,y);
                fill_rectangle(0, 0, 400, 125, color::white);
```

```
                        move_to(300,125);
                        write_string(result);
                        print(result);
                        new_line();} }

            if (yy > 525 && yy < 625)
            {     if (xx > 25  && xx < 125)
                  {     result = 0;
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(300,125);
                        write_string(result);
                        print(result);
                        new_line(); }
                  else if (xx > 150  && xx < 250)
                  {     result = (result *10);
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(300,125);
                        write_string(result);
                        print(result);
                        new_line();}
                  else if (xx > 275 && xx < 375)
                  {     break; }
                  else if (xx > 400 && xx < 500)
                  {     result = result / clicking(x,y);
                        fill_rectangle(0, 0, 400, 125, color::white);
                        move_to(300,125);
                        write_string(result);
                        print(result);
                        new_line();} } }
      return result; }

void main()
{     make_window(800,700);
      buttons();
    clicking(400,70); }
```