Contents

Copyright

```
close all; format compact; clc;
fprintf("Engineer: Rodrigo Becerril Ferreyra\n");
fprintf("Company: California State University, Long Beach\n");
fprintf("Project Name: Task 2\n");
fprintf("Start Date: 02 September 2020\n");
fprintf("End date: 08 September 2020\n");
figure();
```

```
Engineer: Rodrigo Becerril Ferreyra
Company: California State University, Long Beach
Project Name: Task 2
Start Date: 02 September 2020
End date: 08 September 2020
```

Task 2.1

```
fprintf("\nTask 2.1\n");
clear variables;

% a = input("Enter a: ");
% b = input("Enter b: ");
a = 5; b = 2;
res = mod(a,b);
fprintf("The remainder is %d when %d is divided by %d\n", res, a, b);
```

```
Task 2.1
The remainder is 1 when 5 is divided by 2
```

Task 2.2

```
fprintf("\nTask 2.2\n");
clear variables;

% a = input("Enter a: ");
% b = input("Enter b: ");
a = 5; b = 2;
res = a.^b;
fprintf("The answer is %d when %d is raised to the power of %d\n", res, a, b);
```

```
Task 2.2
```

```
The answer is 25 when 5 is raised to the power of 2
```

Task 2.3

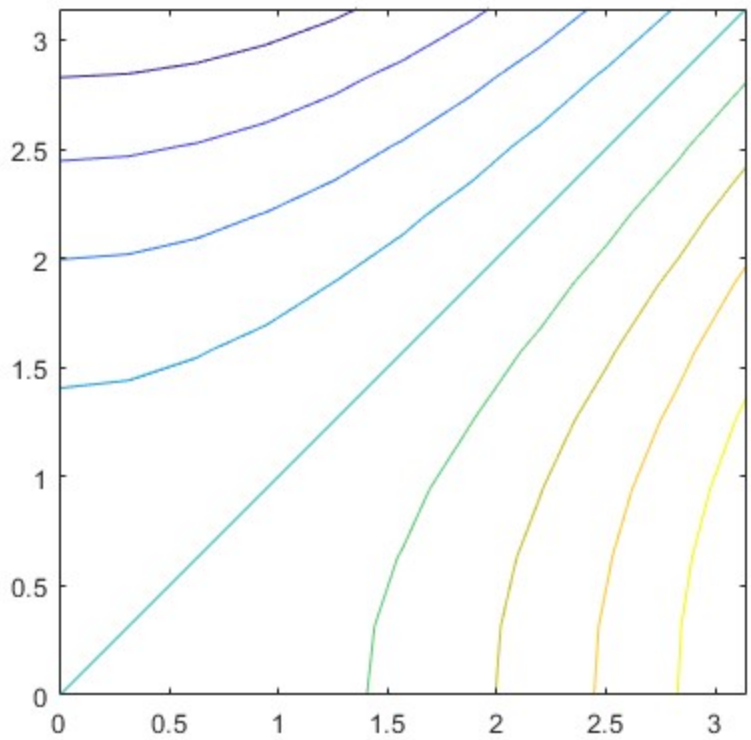
```
fprintf("\nTask 2.3\n");
clear variables;

%x = input("Enter x: ");
x = [0, 1, 2; 3, 4, 5];
y = 2.^x;

%fprintf("x   = {"); fprintf(" %6.3f", x); fprintf("}\n");
%fprintf("2^x = {"); fprintf(" %6.3f", y); fprintf("}\n");
x
fprintf("y = \n\t2^x\n");
y
```

```
Task 2.3
x =
     0     1     2
     3     4     5
y =
        2^x
y =
     1     2     4
     8    16    32
```

Task 2.4.1

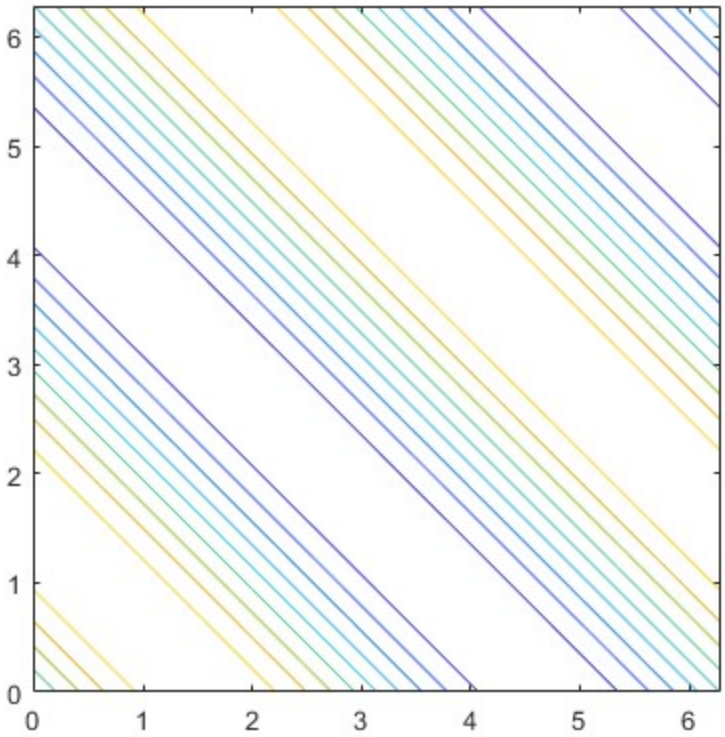
```
fprintf("\nTask 2.4\n");
clear variables;

x = 0 : pi/10 : pi; y = x;
figure();
[X,Y] = meshgrid(x,y);
f = func1(X,Y);
contour(X,Y,f)
axis([0, pi, 0, pi])
axis equal
```

```
Task 2.4
```



Task 2.4.2

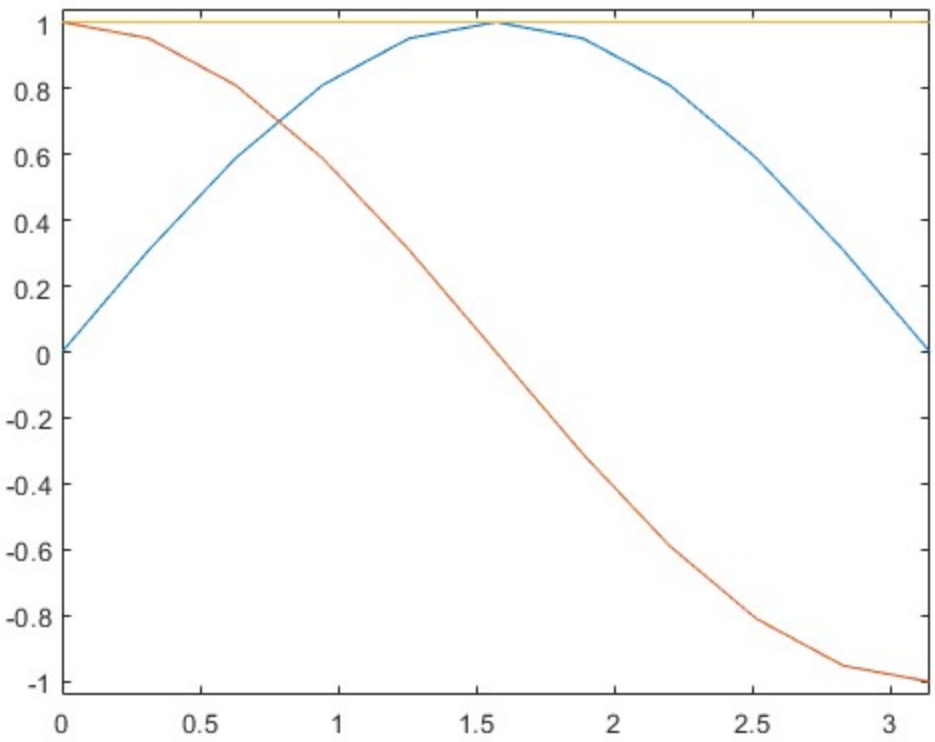
```
x = 0 : pi/10 : 2*pi; y = x;
figure();
[X,Y] = meshgrid(x,y);
f = func2(X,Y);
contour(X,Y,f)
axis([0, 2*pi, 0, 2*pi])
axis equal
```



Task 2.5

```
fprintf("\nTask 2.5\n");
clear variables;

x = 0 : pi/10 : pi;
[a, b, c] = xpowers(x);
figure(); plot(x, a, x, b, x, c);
axis([0, pi, -26/25, 26/25]);
```

```
Task 2.5
```



Task 2.6

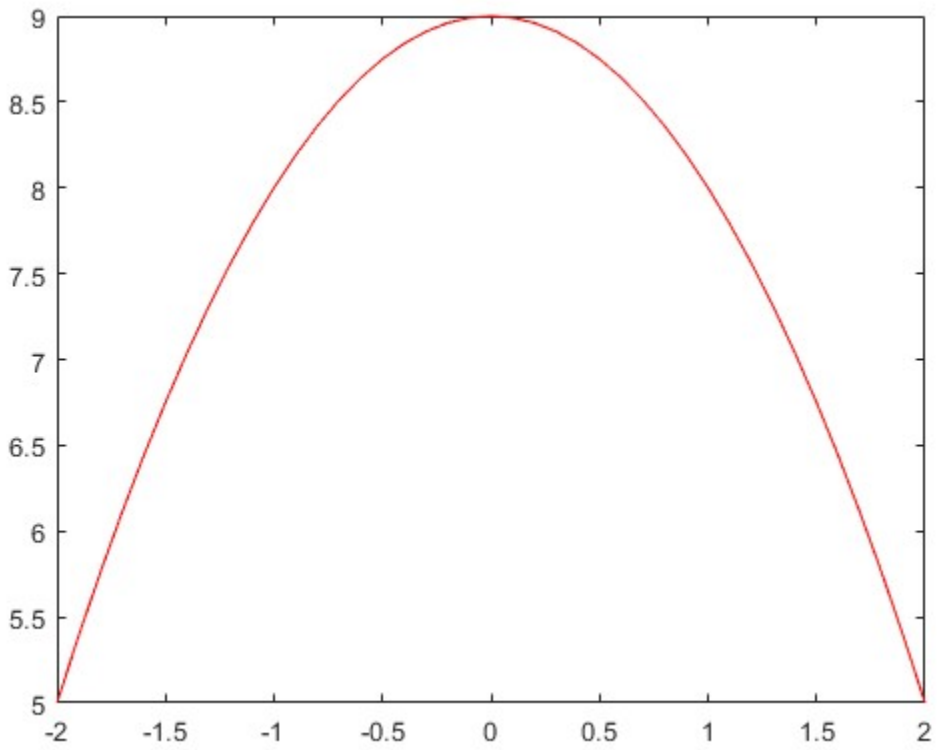
```
fprintf("\nTask 2.5\n");
clear variables;

x = [1.4, 4.5, 7.9];
y = [2.0, 0.5, 3.2];

fprintf("x      = {"); fprintf(" %6.3f", x); fprintf("}\n");
fprintf("y      = {"); fprintf(" %6.3f", y); fprintf("}\n\n");
fprintf("x + y  = {"); fprintf(" %6.3f", x+y); fprintf("}\n");
fprintf("x + 2y = {"); fprintf(" %6.3f", x+2*y); fprintf("}\n");

[a, b] = multi(x, y);

fprintf("Fractional parts:\n")
fprintf("x + y  = {"); fprintf(" %6.3f", a); fprintf("}\n");
fprintf("x + 2y = {"); fprintf(" %6.3f", b); fprintf("}\n");
```

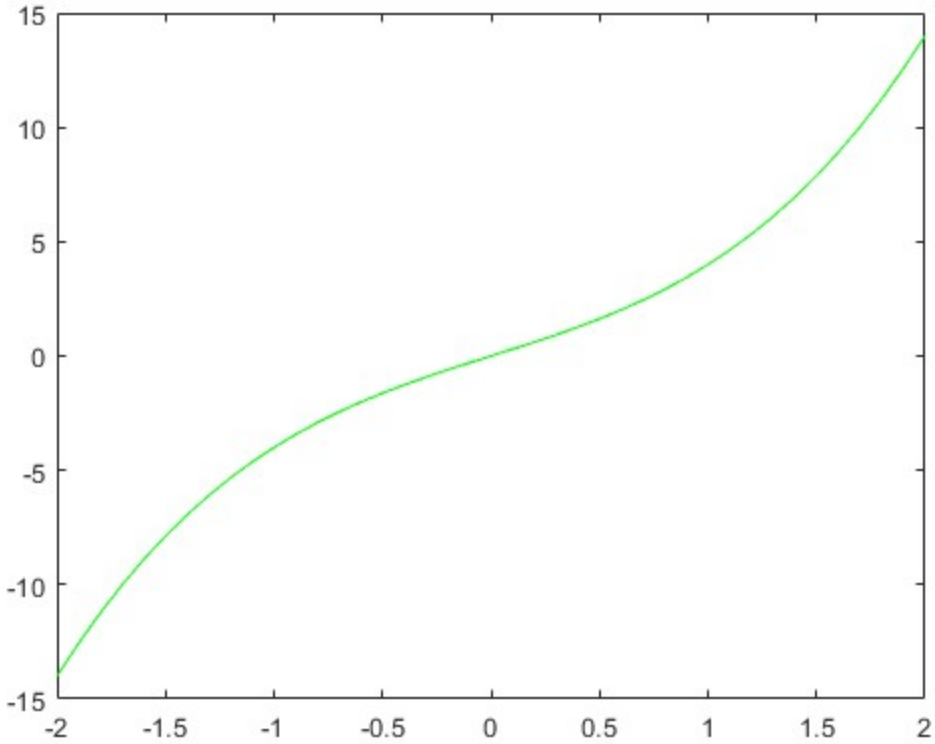
```
Task 2.5
x      = {  1.400  4.500  7.900}
y      = {  2.000  0.500  3.200}

x + y  = {  3.400  5.000 11.100}
x + 2y = {  5.400  5.500 14.300}
Fractional parts:
x + y  = {  0.400  0.000  0.100}
x + 2y = {  0.400  0.500  0.300}
```

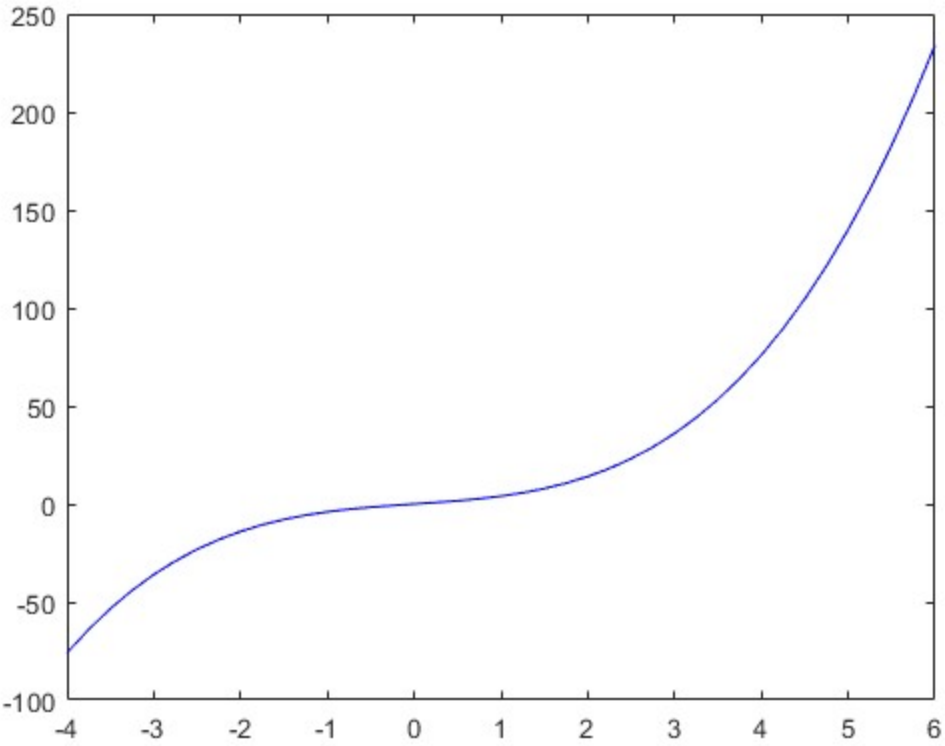
Task 2.7

```
fprintf("\nTask 2.7\n");
clear variables;

x = -2 : 0.1 : 2;
y = 9 - x.^2;
figure(); plot(x, y, 'r');

y1 = x.^3 + 3.*x;
figure(); plot(x, y1, 'g');

x = -4 : 1/4 : 6;
y2 = x.^3 + 3.*x;
figure(); plot(x, y2, 'b');
```

```
Task 2.7
```





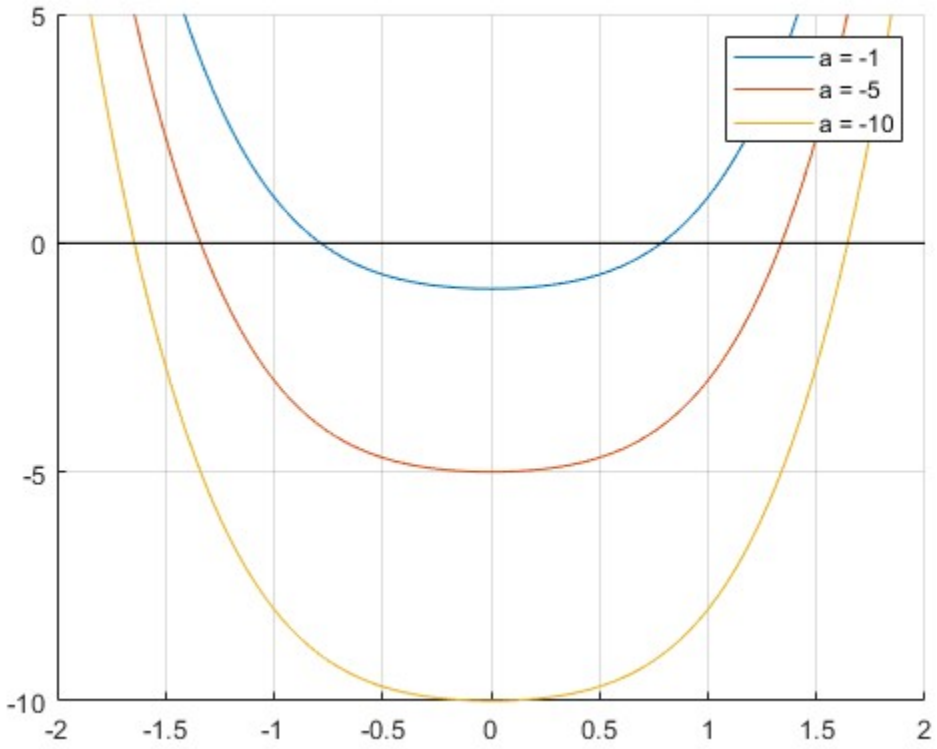


Task 2.8

```
fprintf("\nTask 2.8\n");
```

```
clear variables;

fprintf("The polynomial x^4 + x^2 + a has two real roots for values of a < 0.\n");

figure();
hold on
x = linspace(-2, 2, 101);
y = polyval([1, 0, 1, 0, -1], x);
plot(x, y);

y = polyval([1, 0, 1, 0, -5], x);
plot(x, y);

y = polyval([1, 0, 1, 0, -10], x);
plot(x, y);

plot([-2, 2], [0, 0], 'k');

legend("a = -1", "a = -5", "a = -10");
axis ([-2, 2, -10, 5]);
grid on
hold off
```

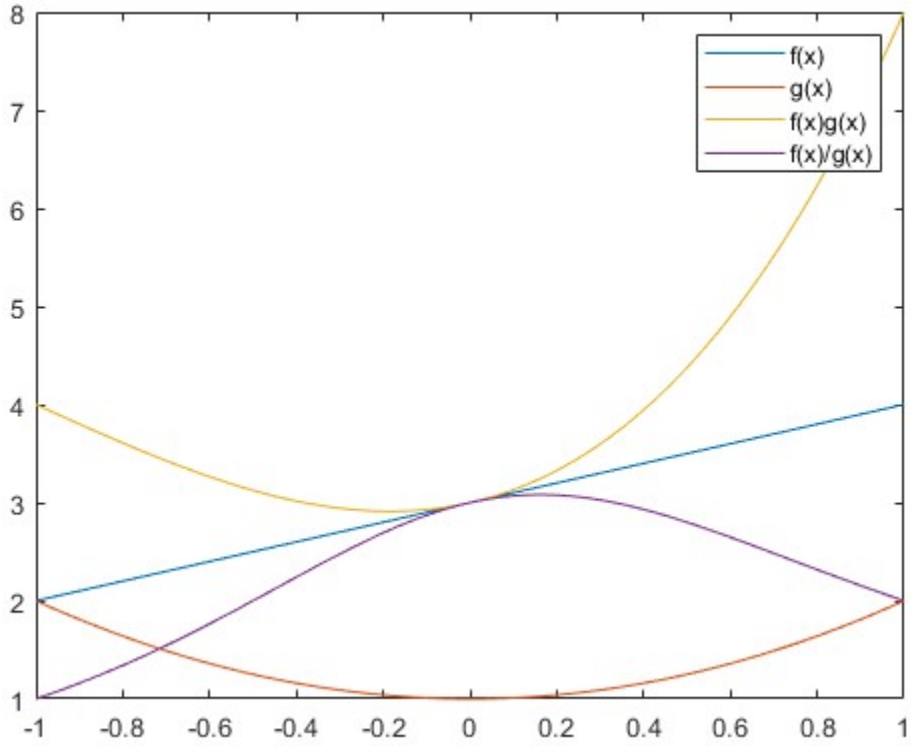
```
Task 2.8
The polynomial x^4 + x^2 + a has two real roots for values of a < 0.
```



Task 2.9

```
fprintf("\nTask 2.9\n");
clear variables;

x = linspace(-1, 1, 101);
f = x + 3;
g = x.^2 + 1;
figure(); plot(x, f, x, g, x, f.*g, x, f./g);
legend("f(x)", "g(x)", "f(x)g(x)", "f(x)/g(x)");
```

```
Task 2.9
```



Task 2.10

```
fprintf("\nTask 2.10\n");
clear variables;

x = 4;
y = x + 2;
z = (y^2 * pi)^-1;

fprintf("x = {"); fprintf(" %6.3f", x); fprintf("}\n");
fprintf("y = {"); fprintf(" %6.3f", y); fprintf("}\n");
fprintf("z = {"); fprintf(" %6.3f", z); fprintf("}\n");

fprintf("\n");

% N = input("Enter N: ");
```

```
N = 1;
total = 0;
for i = 1 : 1 : N
    total = total +( (1/i) + ((i + 2) * (i + 3))^-1 );
end
fprintf("The sum is %f.\n", total);

fprintf("\n");

x = 0 : 0.1 : 1;
y = (x.*cos(x))./((x.^2 + 1) .* (x + 2));
fprintf("x = {"); fprintf(" %6.3f", x); fprintf("}\n");
fprintf("y = {"); fprintf(" %6.3f", y); fprintf("}\n");

fprintf("\n");

w = ones(1, 9);
w(1) = 1;
for j = 1 : 1 : 4
    w(2*j) = 3;
    w(2*j + 1) = 2*j + 1;
end
fprintf("w = {"); fprintf(" %6d", w); fprintf("}\n");
```

```
Task 2.10
x = {  4.000}
y = {  6.000}
z = {  0.009}

The sum is 1.083333.

x = {  0.000  0.100  0.200  0.300  0.400  0.500  0.600  0.700  0.800  0.900  1.000}
y = {  0.000  0.047  0.086  0.114  0.132  0.140  0.140  0.133  0.121  0.107  0.090}

w = {      1      3      3      3      5      3      7      3      9}
```

Task 2.11

```
fprintf("\nTask 2.11\n");
clear variables;

% 1 m/s * 1000 mm/m / 25.4 mm/in / 36 in/yd / 1760 yd/mi * 60 s/min * 60 min/h = 3.6/1.609334 mi/h
speed = 100/10; %m/s
speed_mph = speed * 3.6/1.609334; %mi/h
speed_kph = mi_to_km(speed_mph);

fprintf("Speed in m/s : %f\n", speed);
fprintf("Speed in mi/h: %f\n", speed_mph);
fprintf("Speed in km/h: %f\n", speed_kph);
```

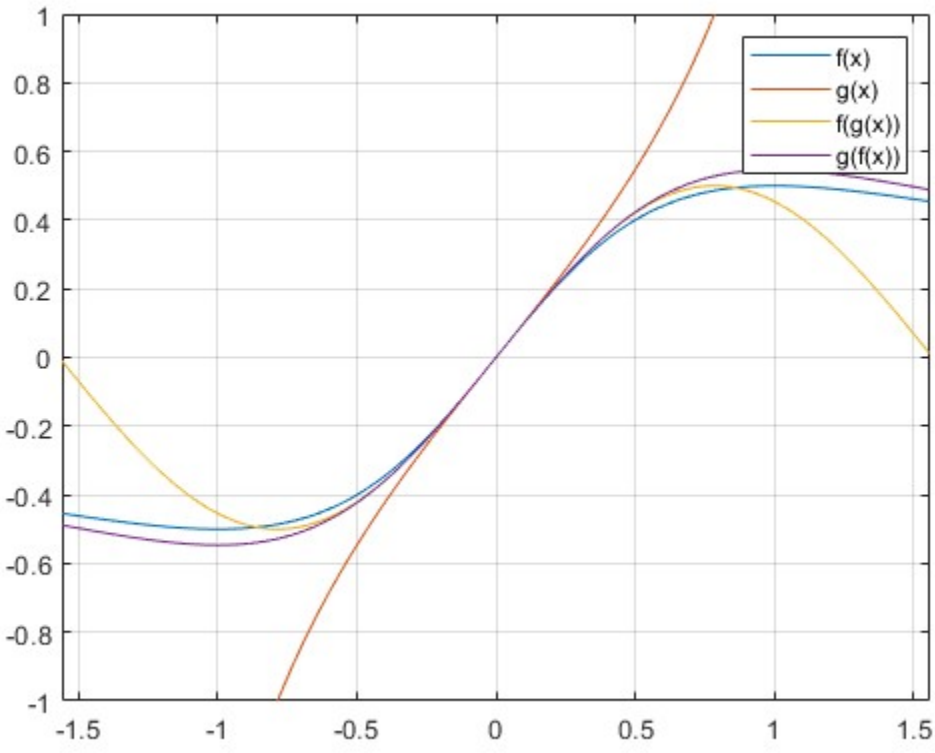
```
Task 2.11
Speed in m/s : 10.000000
```

```
Speed in mi/h: 22.369502
Speed in km/h: 36.000224
```

Task 2.12

```
fprintf("\nTask 2.12\n");
clear variables;

x = -pi/2 + 0.01 : 0.01 : pi/2 - 0.01;
f = x./(1 + x.^2); g = tan(x);
fog = g./(1 + g.^2); gof = tan(f);
figure(); plot(x, f, x, g, x, fog, x, gof);
axis([-pi/2 + 0.01, pi/2 - 0.01, -1, 1]);
grid on; legend("f(x)", "g(x)", "f(g(x))", "g(f(x))");
```

```
Task 2.12
```

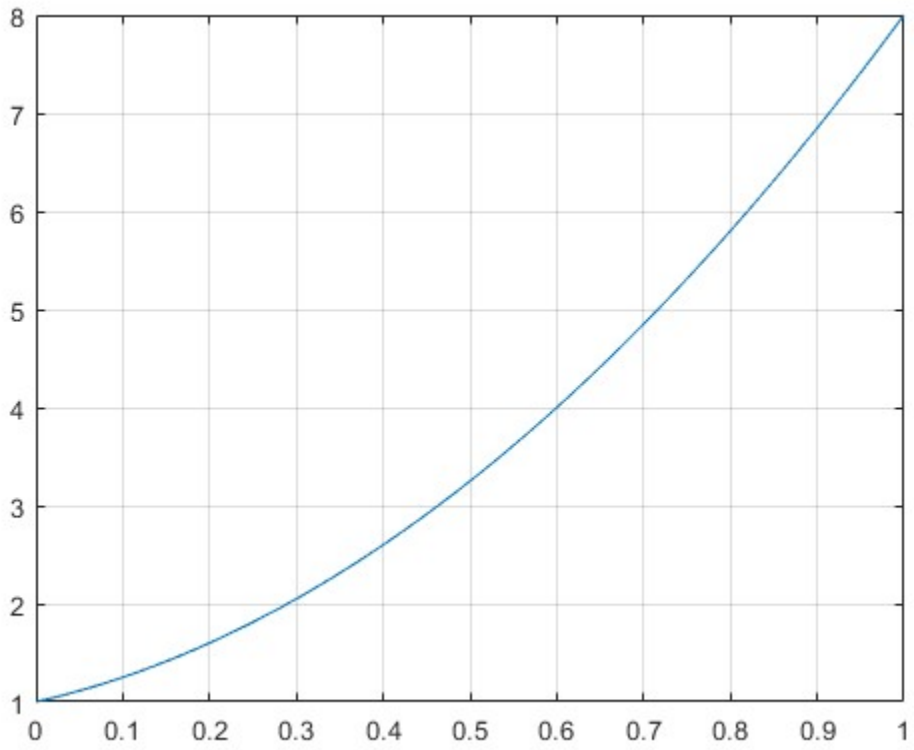


Task 2.13

```
fprintf("\nTask 2.13\n");
clear variables;

fprintf("Please input constants a, b, and c for the function ax^2 + bx + c.\n");
% a = input("a: ");
% b = input("b: ");
% c = input("c: ");
```

```
a = 5; b = 2; c = 1;
fprintf("The equation that you inputted is %fx^2 + %fx + %f.\n", a, b, c);

y = 0 : pi/100 : pi;
x = sin(y);
q = polyval([a, b, c], x);
figure(); plot(x, q);
grid on;
```

```
Task 2.13
Please input constants a, b, and c for the function ax^2 + bx + c.
The equation that you inputted is 5.000000x^2 + 2.000000x + 1.000000.
```



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