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```

Exercício 1

```
clc; clearvars; close all;

dt = 0.01;
t = -2:dt:2;

% 1 - p(t) = exp(2*t)
p = exp(2*t);
dp = diff(p)./diff(t);
figure(1);
plot(t(1:end-1), dp);
title('Derivada Numérica p(t) = exp(2*t)');

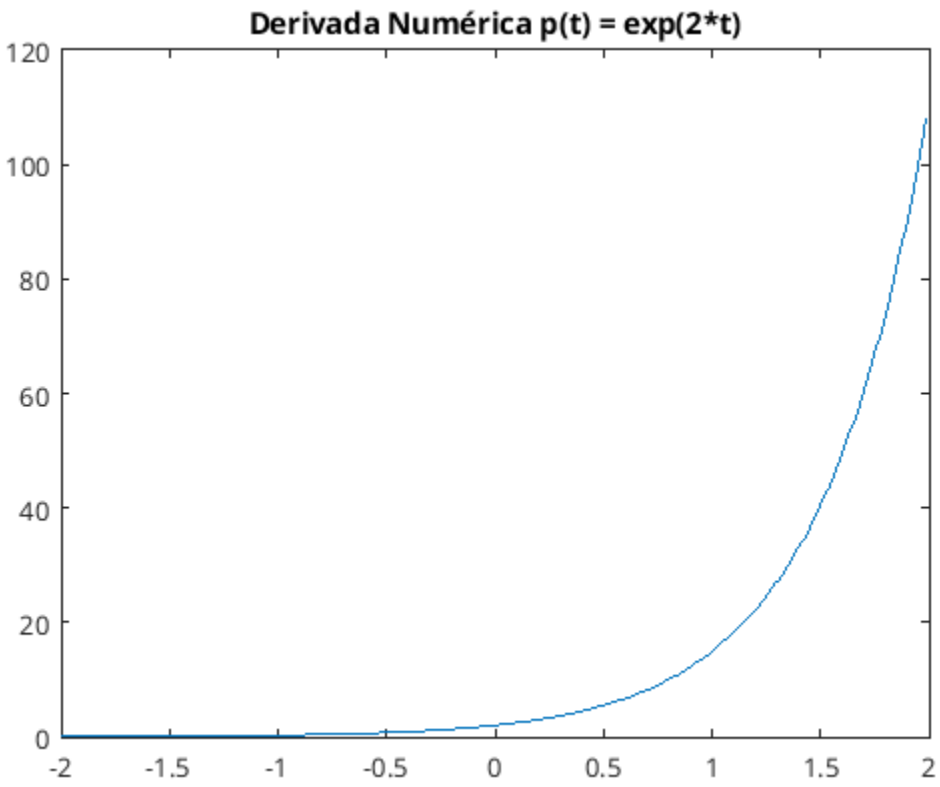
figure(2);
plot(t, 2*exp(2*t));
title('Derivada Analítica p(t) = exp(2*t)');

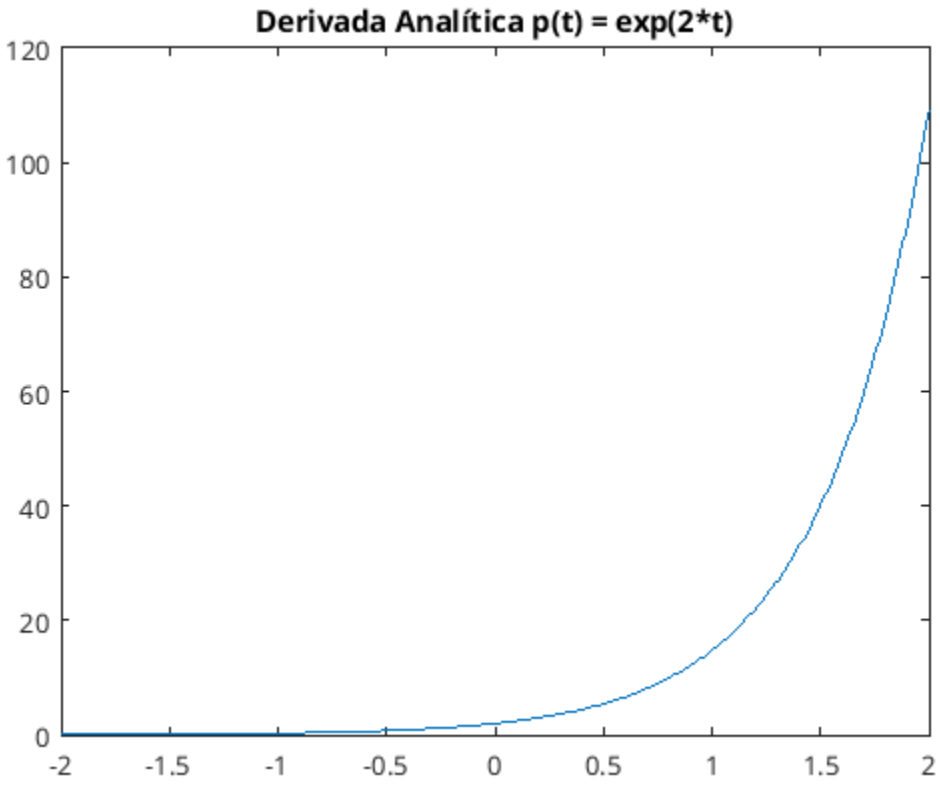
% 2 - m(t) = sin(t)
m = sin(t);
dm = diff(m)./diff(t);
figure(3);
plot(t(1:end-1), dm);
title('Derivada Numérica m(t) = sin(t)');

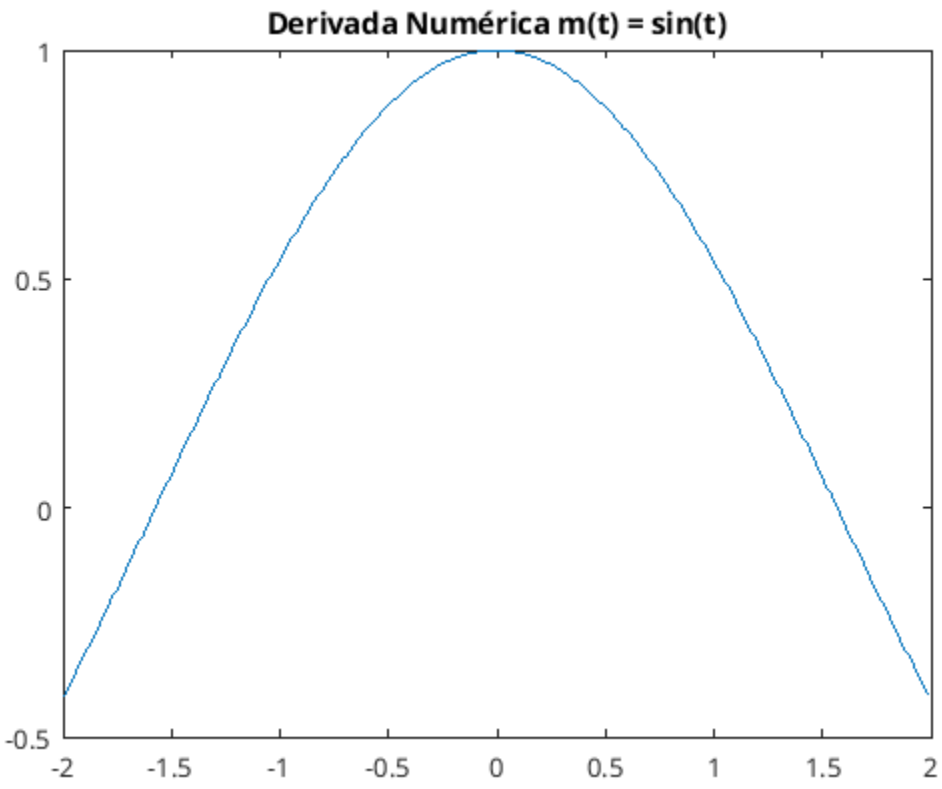
figure(4);
plot(t, cos(t));
title('Derivada Analítica m(t) = sin(t)');

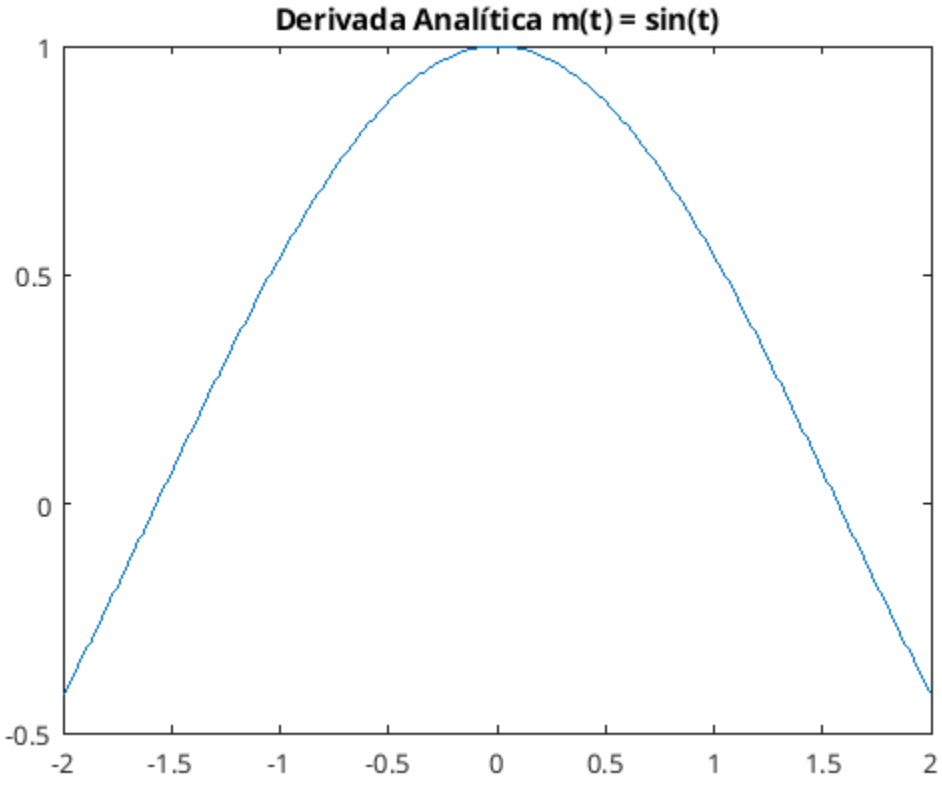
% 3 - q(t) = t^3 + 3*t^2 + 1
q = t.^3 + 3*t.^2 + 1;
dq = diff(q)./diff(t);
figure(5);
plot(t(1:end-1), dq);
title('Derivada Numérica q(t) = t^3 + 3*t^2 + 1');

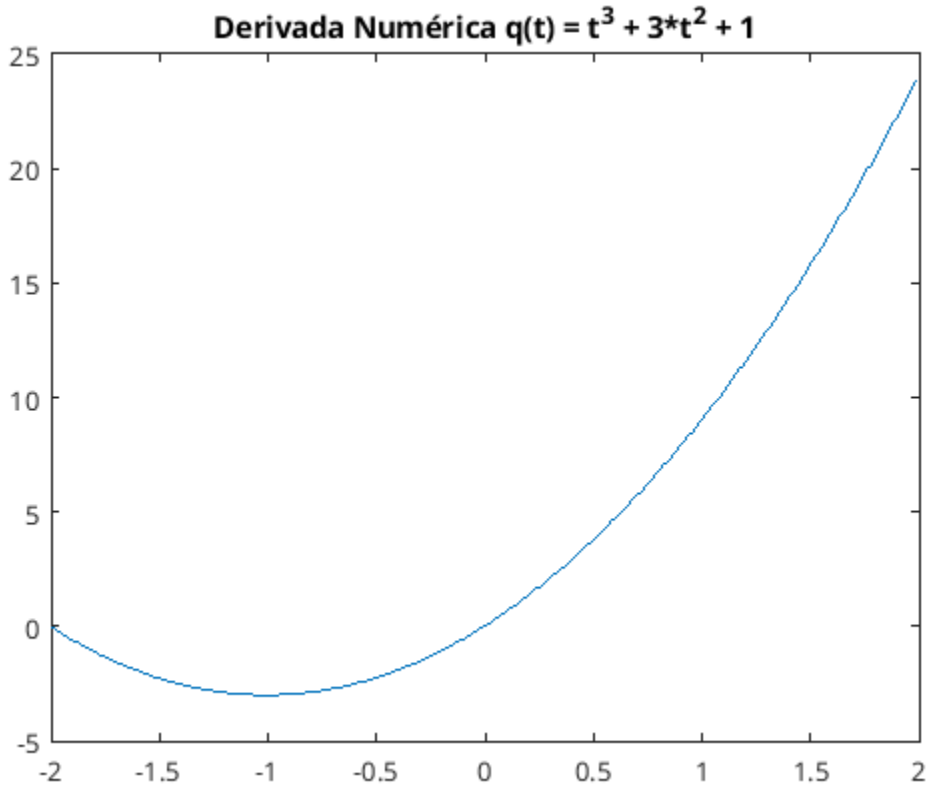
figure(6);
plot(t, 3*t.^2 + 6*t);
title('Derivada Analítica q(t) = t^3 + 3*t^2 + 1');
```

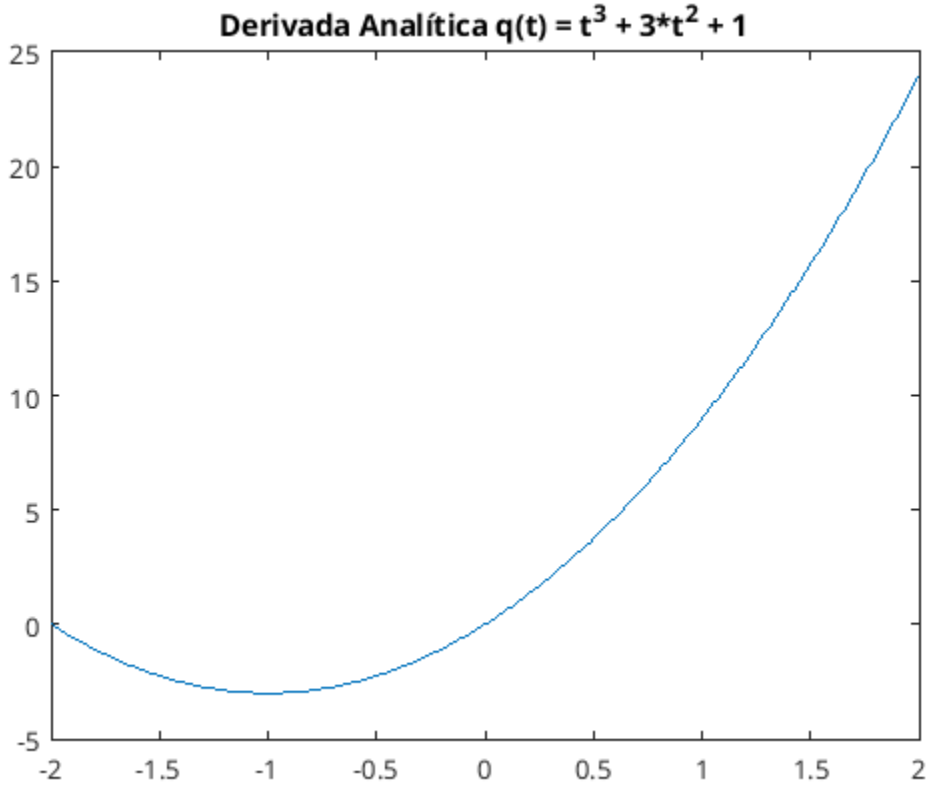

Derivada Numérica p(t) = exp(2*t)
120
100
80
60
40
20
0
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2


Derivada Analítica p(t) = exp(2*t)
120
100
80
60
40
20
0
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2


Derivada Numérica m(t) = sin(t)
1
0.5
0
-0.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2


Derivada Analítica m(t) = sin(t)
1
0.5
0
-0.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2


Derivada Numérica q(t) = t^3 + 3*t^2 + 1
25
20
15
10
5
0
-5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

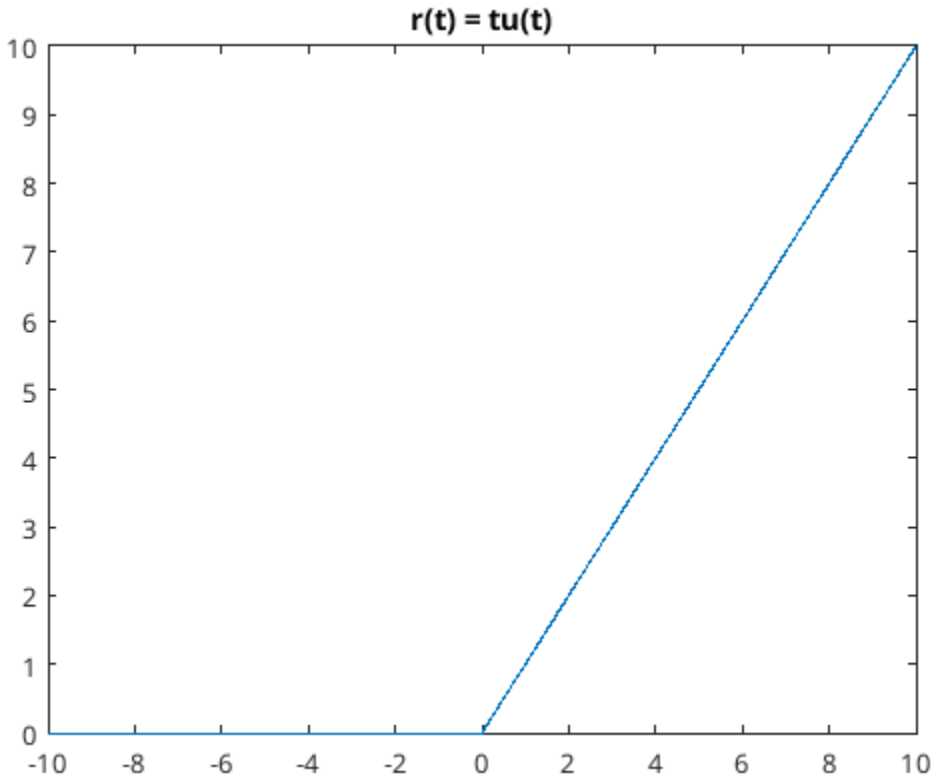

Derivada Analítica q(t) = t^3 + 3*t^2 + 1
25
20
15
10
5
0
-5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

Exercício 2

```
clc; clearvars; close all;

dt = 0.01;
t = -10:dt:10;
u = zeros(size(t));
u(t >= 0) = 1;

% r(t) = tu(t)
r = t.*u;
figure(7);
plot(t, r);
title('r(t) = tu(t)')
```



Exercício 3

```
% 1 - p(t) = Integral de exp(2t) de -1 a 1
clc; clearvars; close all;
dt = 0.01;
t = -1:dt:1;
p = exp(2*t);
intp = trapz(t, p);
disp(intp);
```

```
% 2 - m(t) = Integral de sin(t) de -pi a pi
clc; clearvars; close all;
dt = 0.01;
t = -pi:dt:pi;
m = sin(t);
intm = trapz(t, m);
disp(intm);

% 3 - q(t) = Integral de t^3 + 3*t^2 + 1 de -1 a 1
clc; clearvars; close all;
dt = 0.01;
t = -1:dt:1;
q = t.^3 + 3*t.^2 + 1;
intq = trapz(t, q);
disp(intq);
```

```
    3.6270

  -5.0730e-06

    4.0001
```

Exercício 4

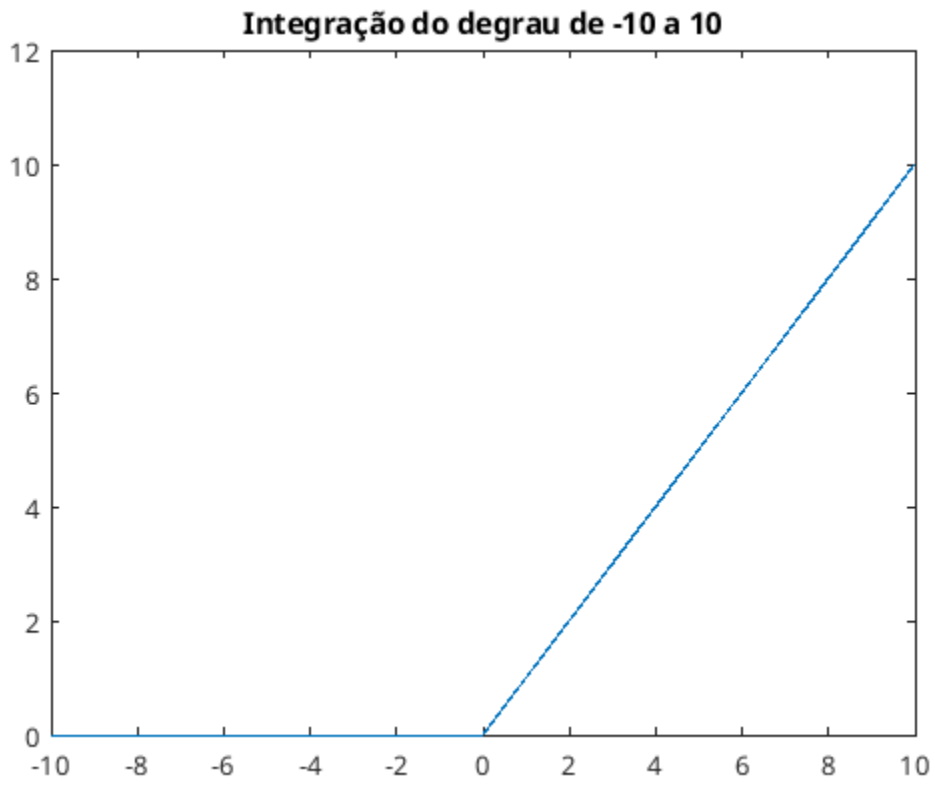
```
clc; clearvars; close all;

dt = 0.01;
t = -10:dt:10;
u = zeros(size(t));
u(t >= 0) = 1;

% Integrando o degrau

intu = cumtrapz(t, u);
figure(8);
plot(t, intu);
title('Integração do degrau de -10 a 10');

% A integração de um degrau no intervalo de -10 a 10 resultou em um sinal
% rampa, como no exercício 2.
```



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