Z Transform

1. Unit Step Signal

Code:

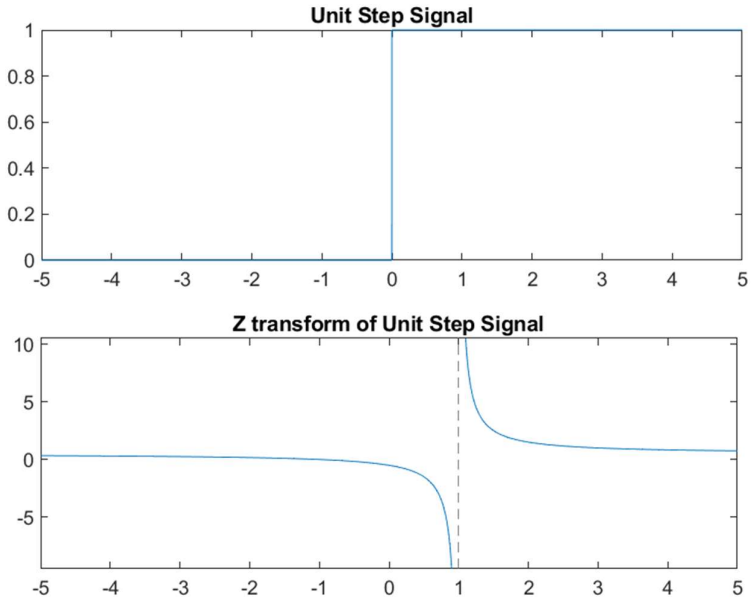
```
syms n;
x = heaviside(n);
y = ztrans(x);
disp('z transform of Unit Step: ');
disp(y);
subplot(211);
fplot(x);
title('Unit Step Signal');
subplot(212);
fplot(y);
title('Z transform of Unit Step Signal');
```

Result:

>> unit

z transform of Unit Step:

1/(z - 1) + ½



2. Unit Impulse Signal

Code:

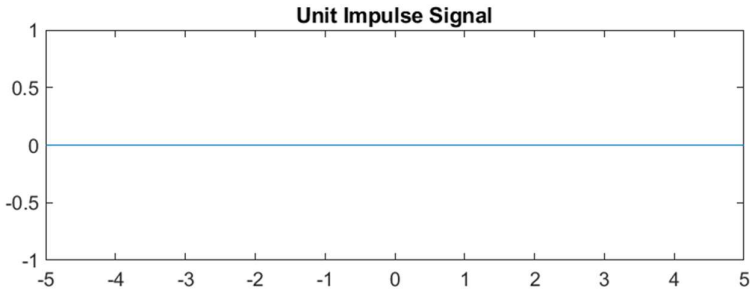
```
syms n;
x = dirac(n);
y = ztrans(x);
disp('z transform of Unit Impulse Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Unit Impulse Signal');
subplot(212);
fplot(y);
title('Z transform of Unit Impulse Signal');
```

Result:

>> impulse

z transform of Unit Impulse Signal:

ztrans(dirac(n), n, z)



3. Signum Function

Code:

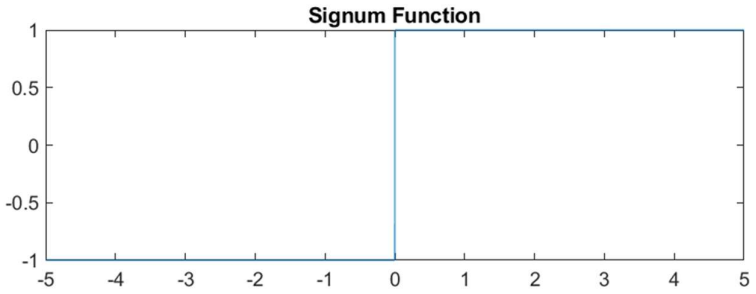
```
syms n;
x = sign(n);
y = ztrans(x);
disp('z transform of Signum Function: ');
disp(y);
subplot(211);
fplot(x);
title('Signum Function');
subplot(212);
fplot(y);
title('Z transform of Signum Function');
```

Result:

>> sign

z transform of Signum Function:

ztrans(sign(n), n, z)



4. Exponential Signal

Code:

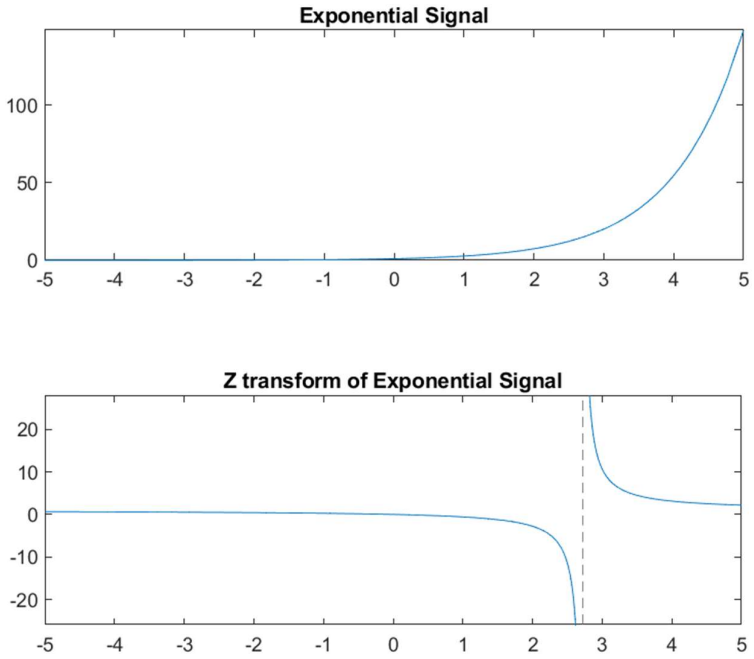
```
syms n;
x = exp(n);
y = ztrans(x);
disp('z transform of Exponential Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Exponential Signal');
subplot(212);
fplot(y);
title('Z transform of Exponential Signal');
```

Result:

>> exp

z transform of Exponential Signal:

z/(z - exp(1))



5. Unit Ramp Signal

Code:

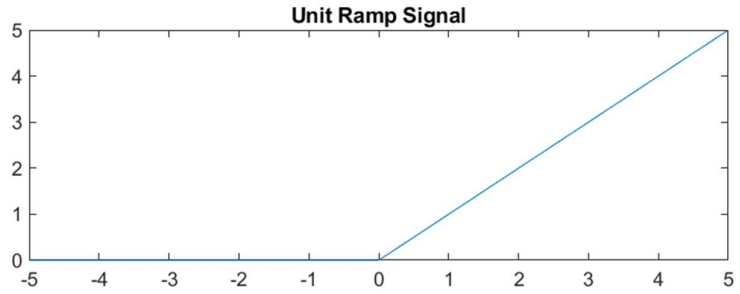
```
syms n;
x = heaviside(n) * n;
y = ztrans(x);
disp('z transform of Unit Ramp Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Unit Ramp Signal');
subplot(212);
fplot(y);
title('Z transform of Unit Ramp Signal');
```

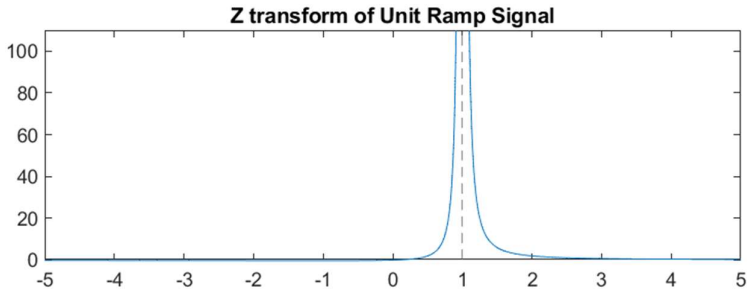
Result:

>> ramp

z transform of Unit Ramp Signal:

z/(z - 1)^2





6. Parabolic Signal

Code:

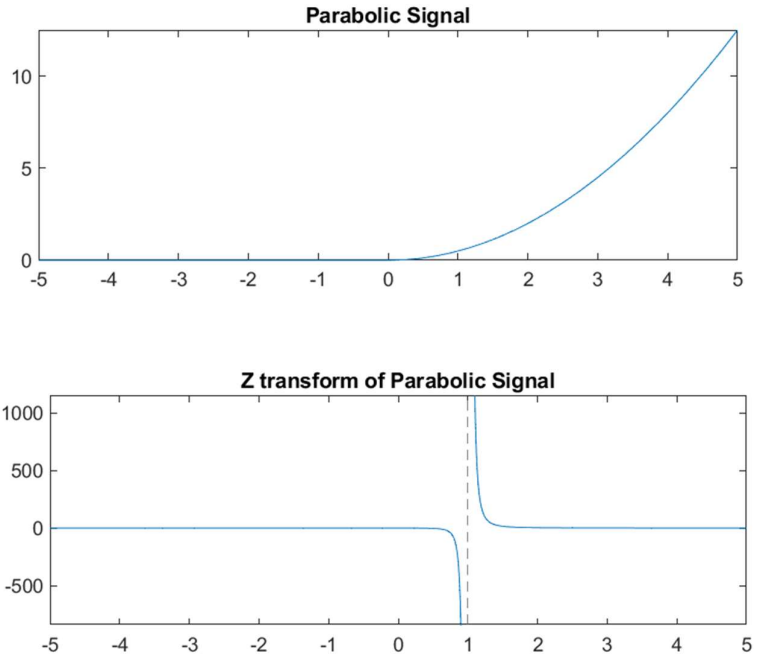
```
syms n;
x = heaviside(n) * ((n ^ 2) / 2);
y = ztrans(x);
disp('z transform of Parabolic Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Parabolic Signal');
subplot(212);
fplot(y);
title('Z transform of Parabolic Signal');
```

Result:

>> par

z transform of Parabolic Signal:

(z(z + 1))/(2*(z - 1)^3)*



7. Rectangular Pulse Signal

Code:

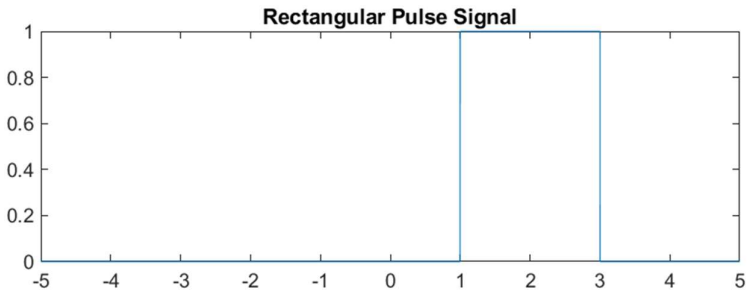
```
syms n;
a = sym(1);
b = sym(3);
x = rectangularPulse(a, b, n);
y = ztrans(x);
disp('z transform of Rectangular Pulse Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Rectangular Pulse Signal');
subplot(212);
fplot(y);
title('Z transform of Rectangular Pulse Signal');
```

Result:

>> rect

z transform of Rectangular Pulse Signal:

ztrans(rectangularPulse(1, 3, n), n, z)



8. Triangular Pulse Signal

Code:

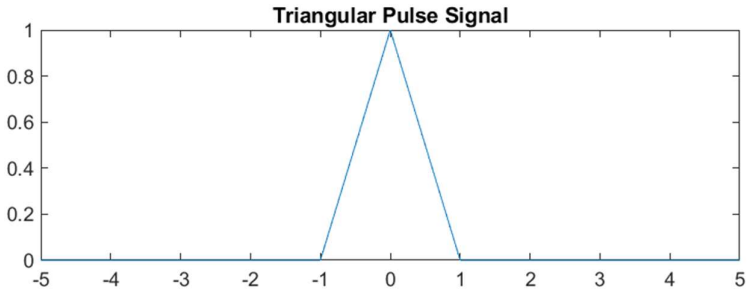
```
syms n;
x = triangularPulse(n);
y = ztrans(x);
disp('z transform of Triangular Pulse Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Triangular Pulse Signal');
subplot(212);
fplot(y);
title('Z transform of Triangular Pulse Signal');
```

Result:

>> tri

z transform of Triangular Pulse Signal:

ztrans(triangularPulse(-1, 0, 1, n), n, z)



9. Sinusoidal Signal

Code:

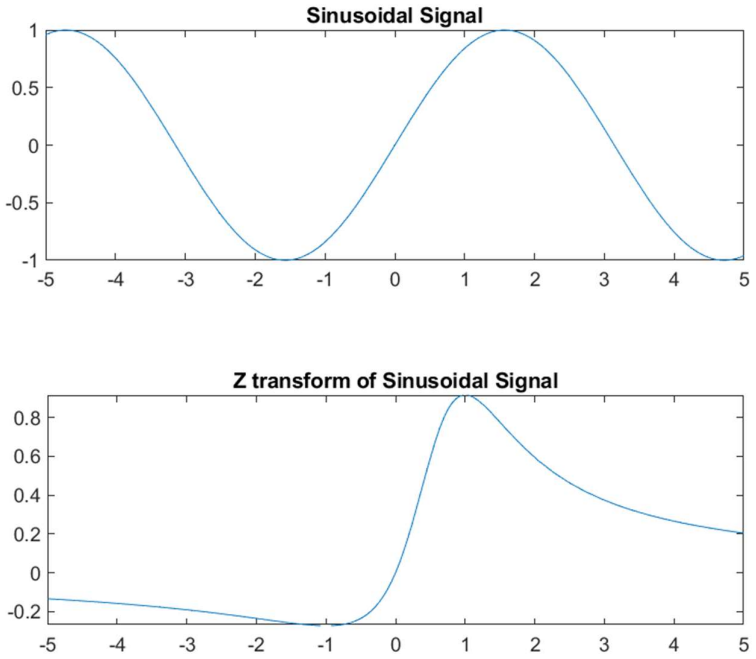
```
syms n;
x = sin(n);
y = ztrans(x);
disp('z transform of Sinusoidal Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Sinusoidal Signal');
subplot(212);
fplot(y);
title('Z transform of Sinusoidal Signal');
```

Result:

>> sin

z transform of Sinusoidal Signal:

*(z*sin(1))/(z^2 - 2*cos(1)*z + 1)*



10. Sinc Function

Code:

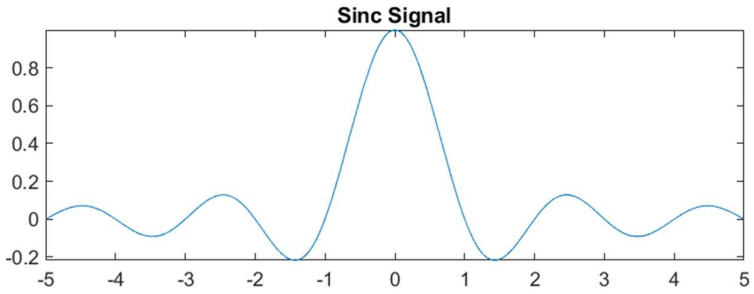
```
syms n;
x = sinc(n);
y = ztrans(x);
disp('z transform of Sinc Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Sinc Signal');
subplot(212);
fplot(y);
title('Z transform of Sinc Signal');
```

Result:

>> sinc

z transform of Sinc Signal:

*ztrans(sin(pi*n)/n, n, z)/pi*



11. Sampling Signal

Code:

```
syms n;
x = sinc((1 / pi) * n);
y = ztrans(x);
disp('z transform of Sampling Signal: ');
disp(y);
subplot(211);
fplot(x);
title('Sampling Signal');
subplot(212);
fplot(y);
title('Z transform of Sampling Signal');
```

Result:

>> samp

z transform of Sampling Signal:

*(18014398509481984*ztrans(sin((5734161139222659*pi*n)/18014398509481984)/n, n, z))/(5734161139222659*pi)*