Homework 1

Math 3607, Autumn 2021

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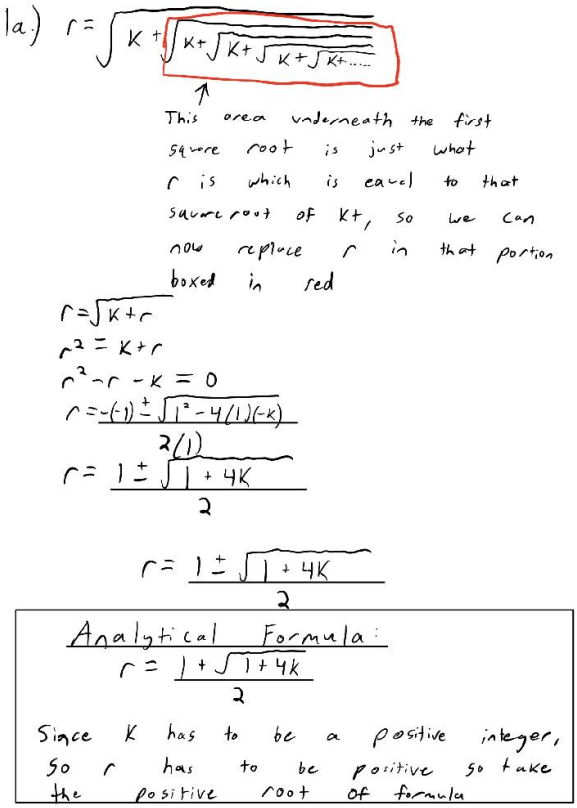
Problem 1



a.) By Hand

b.) On Computer

For K = 2

```
k = 2;
r = (1 + sqrt(1 + 4 * k)) / 2
```

```
r =
     2
```

For K = 3

```
k = 3;
r = (1 + sqrt(1 + 4 * k)) / 2
```

```
r =
          2.30277563773199
```

For K = 4

```
k = 4;
r = (1 + sqrt(1 + 4 * k)) / 2
```

```
r =
          2.56155281280883
```

Problem 2

a.) On Computer

5 Distinct Solutions

$$-1 = e^{i\theta} = \cos\theta + i\sin\theta$$

$$e^{i\pi} = \cos\pi + i\sin\pi = -1 + i\cdot 0 = -1$$
$$e^{i3\pi} = \cos 3\pi + i\sin 3\pi = -1 + i\cdot 0 = -1$$
$$e^{i5\pi} = \cos 5\pi + i\sin 5\pi = -1 + i\cdot 0 = -1$$
$$e^{i7\pi} = \cos 7\pi + i\sin 7\pi = -1 + i\cdot 0 = -1$$
$$e^{i9\pi} = \cos 9\pi + i\sin 9\pi = -1 + i\cdot 0 = -1$$

5 distinct roots of $x^5 + 1$ are of the form

$$e^{i\pi/5},\ e^{i3\pi/5},\ e^{i5\pi/5},\ e^{i7\pi/5},\ e^{i9\pi/5}$$

```
format long g
exp(1*pi*1i/5)
```

```
ans =
         0.809016994374947 +     0.587785252292473i
```

```
exp(3*pi*1i/5)
```

```
ans =
        -0.309016994374947 +     0.951056516295154i
```

```
exp(5*pi*1i/5)
```

```
ans =
```

```
                        -1 +  1.22464679914735e-16i
```

```
exp(7*pi*1i/5)
```

```
ans =
        -0.309016994374948 -     0.951056516295154i
```

```
exp(9*pi*1i/5)
```

```
ans =
         0.809016994374947 -     0.587785252292473i
```

Problem 3

Write a script which asks for a temperature in Fahrenheit. It should then output the temperature in degrees Celsius, kelvins, and degree Rankine . Then run your code with a temperature of 134 Degrees Fahrenheit.

```
Fahrenheit = input('Input a temperature in Fahrenheit: ');
Celsius = (Fahrenheit - 32) * (5 / 9);
Kelvin = (Fahrenheit - 32) * (5 / 9) + 273.15;
Rankine = Fahrenheit + 459.67;
format Long g

disp(['The Temperature in Celsius is: ', num2str(Celsius)])
```

```
The Temperature in Celsius is: 56.6667
```

```
disp(['The Temperature in Kelvin is: ', num2str(Kelvin)])
```

```
The Temperature in Kelvin is: 329.8167
```

```
disp(['The Temperature in Rankine is: ', num2str(Rankine)])
```

```
The Temperature in Rankine is: 593.67
```

Problem 4

Write a script that inputs the equatorial and polar radii and displays both the surface with the given formula and the approximation with the given formula. The inputted Equatorial is 6378.137 km and the inputted polar is 6356.752 km.

```
format long g
r1 = input('Please enter the equatorial radius: ');
r2 = input('Please enter the polar radius: ');
gamma = acos(r1 / r2);
surfaceArea = 2 * pi * (r1^2 + (r2^2 / sin(gamma)) * log(cos(gamma) / (1 - sin(gamma)) ));
approximation = 4 * pi * ((r1 + r2) / 2)^2;

disp(['The Surface Area of the inputted equatorial and polar radii is : ', ...
    num2str(surfaceArea), ' km^2'])
```

```
The Surface Area of the inputted equatorial and polar radii is : 508928675.4242+1.98502254688e-07i km^2
```

```
disp(['The Approximation of the inputted equatorial and polar radii is : ', ...
```

```
    num2str(approximation), ' km^2'])
```

```
The Approximation of the inputted equatorial and polar radii is : 509495321.6397 km^2
```