Q1 - a)

```
syms f(x)
input = [10, 1000, 1000000];
out_mat = zeros(size(input));
f(x) = x*(sqrt(x) - sqrt(x-1))
```

$f(x) = -x \left(\sqrt{x-1} - \sqrt{x} \right)$

```
for i = 1:length(input)
    x = input(i);
    out_mat(i) = vpa(f(x));
end
out_mat
```

```
out_mat = 1×3
10² ×
    0.016227766016838    0.158153431255768    5.000001250000625
```

c)

```
% values from calculator
out_calc = [1.6228, 15.8, 1000];

% absolute error
abs_error = out_calc - out_mat;
abs_error
```

```
abs_error = 1×3
10² ×
    0.000000233983162   -0.000153431255768    4.999998749999375
```

```
rel_error = zeros(size(input));
% relative error
for i=1:length(input)
    rel_error(i) = abs_error(i)/out_mat(i);
end

% Percent of Relative error
per_relative_err = rel_error*100
```

```
per_relative_err = 1×3
    0.001441869212467   -0.097014180817616   99.999949999987507
```

d) Calculation done in word with a calculator

e)

```
out_mat_new = [1.62278, 15.8153, 500];
% absolute error
abs_error = out_mat_new - out_mat;
```

```
abs_error
```

```
abs_error = 1×3
10⁻³ ×
    0.003398316206660   -0.043125576773662   -0.125000062496383
```

```matlab
rel_error = zeros(size(input));
% relative error
for i=1:length(input)
    rel_error(i) = abs_error(i)/out_mat(i);
end

% Percent of Relative error
per_relative_err = rel_error*100
```

```
per_relative_err = 1×3
10⁻³ ×
    0.209413680424876   -0.272681891447036   -0.025000006249272
```

```matlab
% fprintf('%f.32', out_mat_new)
```