

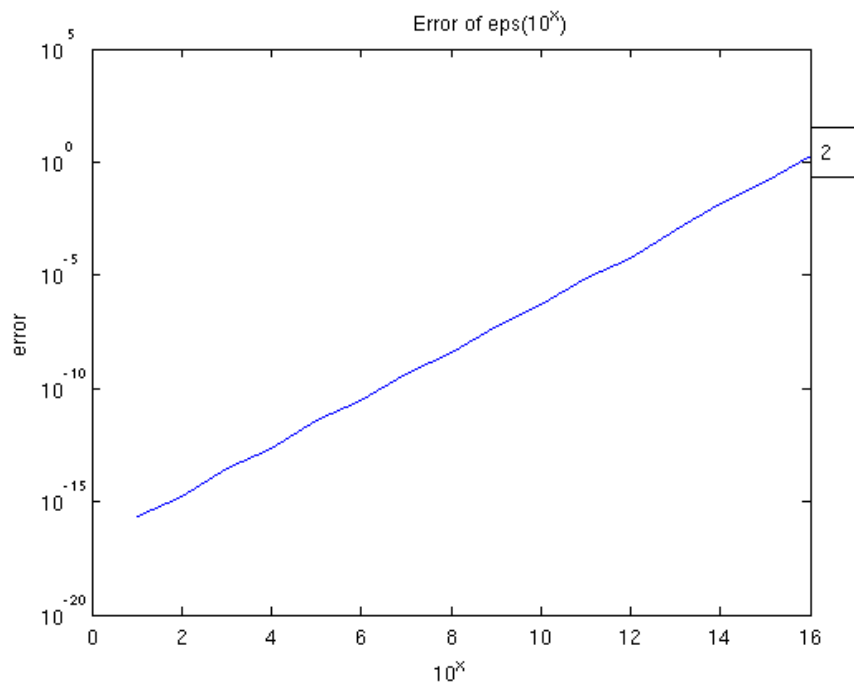
Computational Accuracy Examples

Decimal Representation

```
% Decimal representation of 0.1 and repeated addition
x = 0.1;
for i = 1:1000
    x = x + 0.001;
end
disp(x)
```

Relative Change in eps

```
% eps error at different powers of 10
t = logspace(0,16,16);
plot(eps(t), set(gca, 'YScale', 'log'))
```

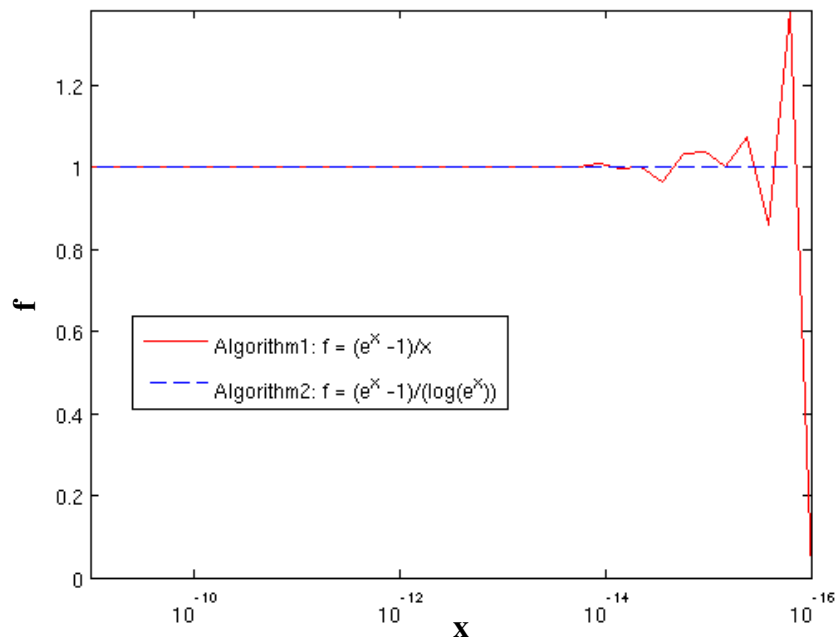


Scaling problems correctly

```
% Scaling larger problems - (e^x - 1)/x
x = logspace(-9,-16,35);
f1 = (exp(x) - 1)./x;

y = exp(x);
f2 = (y - 1)./ log(y);

plot(x, f1, 'r', x, f2, 'b--')
set(gca, 'XScale', 'log', 'Xdir', 'reverse')
```



Fine Structure Granulation

% exponential algorithm - looks at fine numerical structure

```
num = 10000000;
n = num/2:num;
```

```
exp_guess = (1 + 1./n).^n;
diff = exp(1) - exp_guess; % Compare e to the approximation
```

```
subplot(1,2,1), plot(diff), title('Gross Structure')
subplot(1,2,2), plot(diff(1:1000), 'b.'), title('Fine Structure')
```

