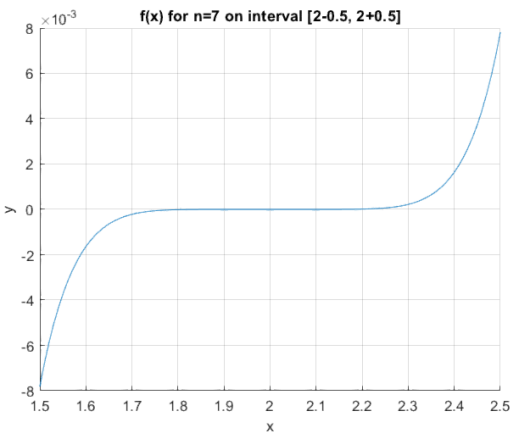
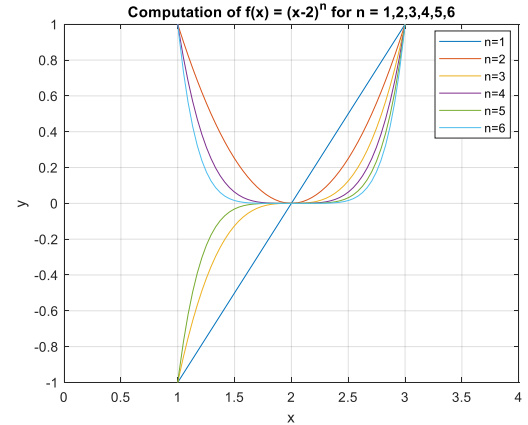


MACM 316 – Assignment 1

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- As n gets larger, the curve wavers in a given direction with greater strength. If n is even, the function is always positive. If n is odd, the function negative on $x = [-\infty, 2)$.
- The program will calculate $f(x)$ for any set of real numbers x , a single real number a , and a single positive integer n .



3.

$n=7$

Delta=0.5: line is smooth.

Delta=0.05: line is smooth.

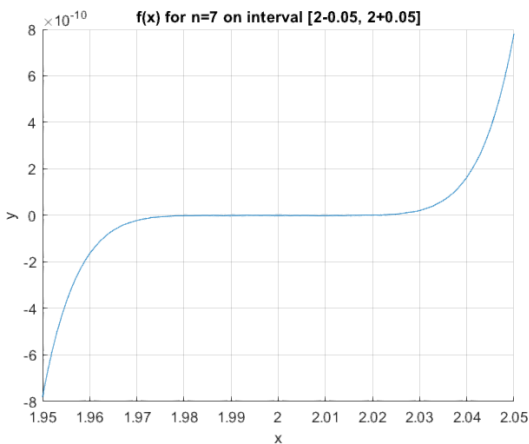
Delta=0.005: line becomes very inaccurate.

$n=8$

Delta=0.5: line is smooth.

Delta=0.05: line becomes inaccurate.

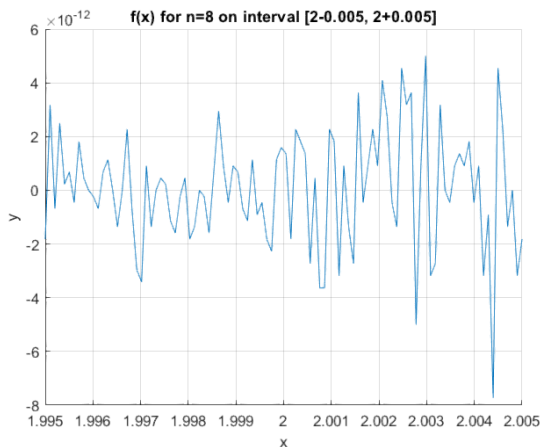
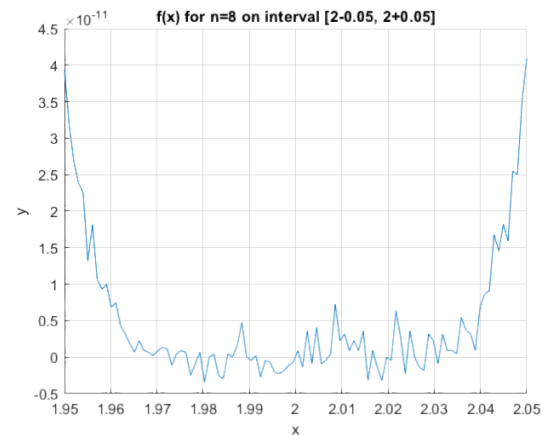
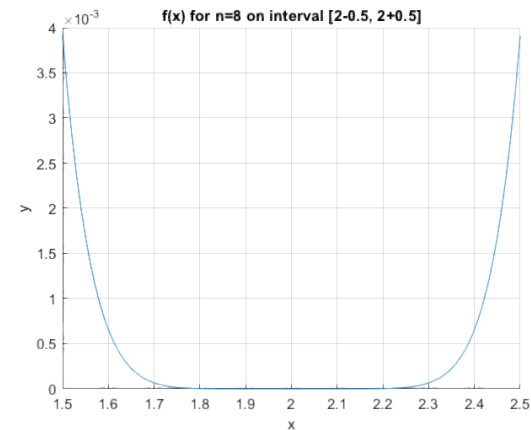
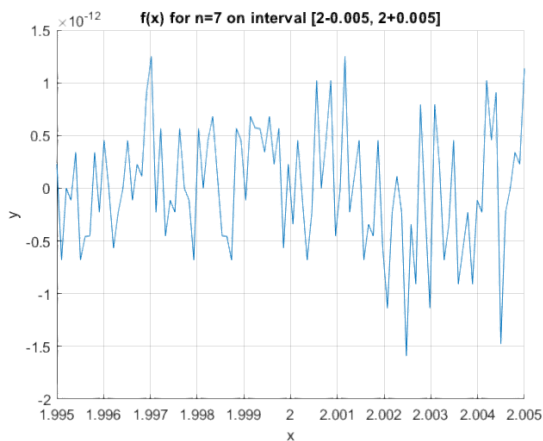
Delta=0.005: line is very inaccurate.



a) The smallest value would be 5. After this, we can visually notice a difference.

b) As n gets larger, the graph gets more and more inaccurate.

c) When we have a term with a large exponent, its result is often rounded, and by adding this to other rounded terms, we begin to accumulate an increasingly large error.



1.

```
x=linspace(0,4)
styles = ['+', 'o', '*', '.', 'x', 's'];
for n=1:6
    plot(x, (x-2).^n)
    hold on
end
xlim([0,4])
ylim([-1,1])
legend('n=1', 'n=2', 'n=3', 'n=4', 'n=5', 'n=6', 'location', 'best')
grid on
xlabel('x'), ylabel('y')
title 'Computation of  $f(x) = (x-2)^n$  for  $n = 1, 2, 3, 4, 5, 6$ '
```

2.

```
function [f] = polycomp(a,n,x)
    if floor(n)==n && n>=0 && length(a)==1
        f = 0;
        for k = 0:n
            f=f+nchoosek(n,k).*x.^(n-k).*(-a).^k;
        end
    else
        error('n must be a single positive integer and a must be a single real number')
    end
end
```

3.

```
intvs = [.5 .05 .005];
for i = 1:length(intvs)
    x = linspace(2-intvs(i), 2+intvs(i));
    for n = 7:8
        f = 0;
        for k = 0:n
            f=f+nchoosek(n,k)*x.^(n-k)*(-2).^k;
        end
        hold on
        plot(x, f)
        grid on
        xlabel('x'), ylabel('y')
        xlim([2-intvs(i),2+intvs(i)])
        title(['f(x) for n=', num2str(n) ' on interval [2-', num2str(intvs(i)) ', 2+' num2str(intvs(i)) '])
        figure()
    end
end
```