Homework 2. Find the equation $y = p_1(x)$ of the tangent line to the function $f(x) = \frac{1}{x}$ at the point $x_0 = 2$. Express your answer in the form $p_1(x) = d + m(x-2)$ for some constants d & m.

Soln: $p_1(x) =$.

Homework 4. Find the second order Taylor polynomial $y = p_2(x)$ for $f(x) = \frac{1}{x}$ at $x_0 = -2$. First fill in the Helpful Table for Homework 4. Then express your answer in the form

$$p_2(x) = c_0 + c_1(x -^{-} 2) + c_2(x -^{-} 2)^2 \quad \text{or} \quad p_2(x) = c_0 + c_1(x+2) + c_2(x+2)^2$$

for some constants c_0, c_1, c_2.

Helpful Table for Homework 4

n	$f^{(n)}(x)$	$f^{(n)}(x_0) \overset{\text{here}}{=} f^{(n)}(-2)$	$c_n \overset{\text{def}}{=} \frac{f^{(n)}(x_0)}{n!} \overset{\text{here}}{=} \frac{f^{(n)}(-2)}{n!}$
0	$f^{(0)}(x) \overset{\text{def}}{=} f(x) = x^{-1}$		
1			
2			

Soln: $p_2(x) =$.

Homework 6. For the function $f(x) = \sin(3x)$ from Example 5, find the Maclaurin polynomials:

$$y = p_1(x),\ y = p_3(x),\ y = p_5(x),\ y = p_7(x),\ y = p_9(x),\ y = p_{11}(x), \text{ and } y = p_{13}(x)\ .$$

First fill out the Helpful Table and then indicate the Maclaurin polynomials in the Solution Table.

We are looking for patterns so you may leave/express, e.g., 3^5 as just 3^5 rather than 243 and 5! as just 5! rather than 120; in short, you do not need a calculator.

Helpful Table for Homework 6			
n	$f^{(n)}(x)$	$f^{(n)}(x_0) \overset{\text{here}}{=} f^{(n)}(0)$	$c_n \overset{\text{def}}{=} \frac{f^{(n)}(x_0)}{n!} \overset{\text{here}}{=} \frac{f^{(n)}(0)}{n!}$
0	$\sin(3x) \overset{\text{note}}{=} +3^0 \sin(3x)$	0	0
1	$3\cos(3x) \overset{\text{note}}{=} +3^1 \cos(3x)$	$+3^1$	$+\frac{3^1}{1!}$
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Solution Table for Homework 6	
n	$y = p_n(x)$
1	
3	
5	$p_5(x) = \frac{3^1}{1!}x^1 - \frac{3^3}{3!}x^3 + \frac{3^5}{5!}x^5$
7	
9	
11	
13	

Bonus problem. In Homework 6, what is the 4^{th}-order Maclaurin polynomial?

Soln: $p_4(x) =$.