Finite and divided differences. Taylor polynomial

A

1. Complete the following finite difference table:

f	Δf	$\Delta^2 f$	$\Delta^3 f$	$\Delta^4 f$
1	-	-	-	20
1	1	-	13	
2	-	7		
-	2			
-				

2. Construct the divided difference table for the information:

x	1	3	4	6	7
$f(x)$	3	0	5	7	1

3. Compute a quadratic Taylor polynomial for $f(x) = (1+x)^{\frac{1}{3}}$ around $x_0 = 0$.

4. Find a bound of the error for the Taylor polynomial of degree 5 corresponding to the function $f(x) = \sin x$, around $x_0 = 0$, on the interval $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$.

B

1. Complete the following finite difference table:

f	Δf	$\Delta^2 f$	$\Delta^3 f$	$\Delta^4 f$
3	-	-	-	-32
-1	1	-	-28	
0	-	-19		
-	-9			
-				

2. Construct the divided difference table for the information:

x	1	2	5	8	11
$f(x)$	5	6	3	6	5

3. Compute a quadratic Taylor polynomial for $f(x) = \cos x$ around $x_0 = \frac{\pi}{4}$.

4. Find a bound of the error for the Taylor polynomial of degree 3 corresponding to the function $f(x) = \ln(x+1)$, around $x_0 = 0$, on the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$.