

## Quiz 8: Section 8.4, Problem 7

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Calculate the Taylor polynomials  $T_2(x)$  and  $T_3(x)$  centered at  $a = 0$  for the function  $f(x) = \frac{1}{1+x^2}$ . Recall:

$$T_N = \sum_{j=0}^N \frac{f^{(j)}(a)}{j!} (x-a)^j$$


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We have the following:

$k$	$f^{(k)}(x)$	$f^{(k)}(0)$	$\frac{f^{(k)}(0)}{k!}$
0	$\frac{1}{1+x^2}$	1	1
1	$-\frac{2x}{(1+x^2)^2}$	0	0
2	$\frac{8x^2}{(1+x^2)^3} - \frac{2}{(1+x^2)^2}$	-2	-1
3	$-\frac{48x^3}{(1+x^2)^4} + \frac{24x}{(1+x^2)^3}$	0	0

Therefore,

$$T_2(x) = T_3(x) = 1 - x^2$$