MATH 19 PROBLEM SET 9
FALL 2016
BROWN UNIVERSITY
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1 Find the Maclaurin series for $f(x)$ using the definition of a Maclaurin series.

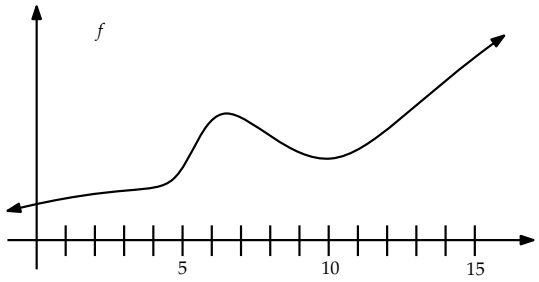
(a) $f(x) = \sin(\pi x)$ (b) $f(x) = 2^x$

2 Find the Maclaurin series for

$$f(x) = \frac{x}{1-2x}$$

and find its radius of convergence.

3 There is an integer c between 0 and 15 for which the second-order Taylor polynomial of the function f shown below, centered at c, is equal to $\frac{9}{2} - \frac{x-c}{3} - 2(x-c)^2$. Find the zeroth, first, and second derivatives of f at c and find c.



4 If $f^{(n)}(0) = (n+1)!$ for all $n \geq 0$, find the Maclaurin series for f and the radius of convergence of the Maclaurin series.

5 Try to approximate $\sqrt{101}$ by (a) calculating the third degree Taylor polynomial for $f(x) = \sqrt{x}$ centered at $x = 1$ and substituting $x = 101$, and (b) substituting $x = 1.01$ into the same Taylor polynomial and moving the decimal point as necessary to obtain an approximation for $\sqrt{101}$ rather than $\sqrt{1.01}$. (c) Which method of approximating $\sqrt{101}$ is more accurate? Why?