

1. Let $f(x) = \sqrt{x+1}$.

- (a) Develop $p_2(x)$, second degree Taylor polynomial for $f(x)$ around $a = 0$.
- (b) Use $p_2(x)$ to approximate $\sqrt{1.1}$.
- (c) What is a good upper bound for the error? Be sure to be able to explain your method.

2. *The Mystery Polynomial Problem*

The mystery polynomial, $p(x)$, is of degree 9 where $(p(x) - 1)$ is exactly divisible by $(x - 1)^5$.

- (a) Find the value of $p(1)$.
- (b) Show that $p'(x)$ is exactly divisible by $(x - 1)^4$.
- (c) Now also given that $(p(x) + 1)$ is exactly divisible by $(x + 1)^5$, find $p(x)$.