1. Find the second degree Taylor polynomial about $a = 10$ for $f(x) = 1/x$ and use it to compute $1/10.05$ to as many decimal places as is justified by this approximation.

   Solution: Since $f'(x) = -1/x^2$ and $f''(x) = 2/x^3$, $f(10) = 1/10$, $f'(10) = -1/100$, and $f''(10) = 1/500$, and so

$$T_2(x) = 1/10 - (x-10)/100 + (x-10)^2/1000$$

   Also, $f'''(x) = -6/x^4$, and we have $|f'''(t)| = 6/t^4 \leq 6/10^4$ for all t in the interval $[10, 10.05]$. Taking $M = 6/10^4$, we have

$$|R_2(10.05)| \leq (6/10^4)(10.05-10)^3/3! = 1/(10^4 \cdot 20^3) = (1/8) \cdot 10^{-7}$$

   We have $T_2(10.05) = 1/10 - .05/100 + (.05)^2/1000 = 0.0995025$. Since the error bound above is less than $(0.5) \cdot 10^{-7}$, we can assert that $1/10.05 \approx 0.0995025$ to 7 decimal places.