Section 10.2/10.3

1. The following parts refer to $f(x) = \frac{1}{3-x}$.

A. Write the Taylor series expansion for $f(x)$ about $x = 0$.

B. Expand $f(x)$ in a Taylor series in terms of $\frac{x}{3}$ about $x = 0$.

C. Find the Taylor series expansion for $f(x)$ about $x = 2$ without actually taking the derivatives. (Hint: rewrite the denominator so that $x-2$ appears.)

D. Do part C by actually taking the derivatives of. $f(x)$. Is your series expansion identical to the one you got in part C?

E. Use part A to find each of the following

(i) $f'(0)$ (ii) $f'''(0)$ (iii) $f^{(5)}(0)$

F. Use part C to find each of the following

(i) $f'(2)$ (ii) $f'''(2)$ (iii) $f^{(5)}(2)$

G. Find the Taylor series expansion about $x = 0$. Include at least four nonzero terms.

(i) $\dfrac{x}{3-x}$

(ii) $\dfrac{e^{-x}}{3-x}$