CORRECTION #3

The answer to problem 59 in the notes contains an error, although the final answer is correct.

The formula for $T_4\{\cos x\}$ is correct, but in the formula for $R_4\{\cos x\}$ it is assumed that $f^{(5)}(\xi) = \cos \xi$ which is wrong. It should be $f^{(5)}(\xi) = -\sin \xi$. One then uses that $|\sin \xi| \leq 1$ no matter what $\xi$ is, and concludes

$$|\cos x - \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!}\right)| = |R_4(x)| \leq \left| -\sin \xi \cdot \frac{x^5}{5!}\right| \leq \frac{|x^5|}{5!} < \frac{1}{5!}$$

for $|x| < 1$. 