12.4: 1, 3, 4, 15, 32, 41, 48

12.5: 2, 5, 15, 27, 29, 33, 35.

12.6: 1, 2, 5, 9, 10, 11, 13, 17;

12.7: 3, 7, 20, 31, 34;

12.8: 1, 3, 4, 5, 8, 19, 27, 41, 44.

Routine problems (not to hand in):

• Make use of the material in the notes "Taylor polys" to do the following: For each of the functions below, used the known expansions for e^x, $\sin x$, $\cos x$, and $(1-x)^{-1}$, together with the techniques from the notes to find the 5th order Taylor polynomial (about $a = 0$):

$$(x^2+1)e^x\,, \quad \cos(x^3)\,, \quad \sin(x+x^2)\,, \quad \cos(e^x-1)\,.$$

• In each of the following, compute the limit by using Taylor expansions of the numerator and denominator:

$$\lim_{x\to 0} \frac{e^x - e^{-x}}{\sin 5x}\,, \quad \lim_{x\to 0} \frac{\sin^4 x}{1-\cos(x^2)}\,.$$

• To hand in:

(1) Problem 66 on page 613 of the text.
Note: *There is a typo:* $s_q = \sum_{k=0}^{q} \frac{1}{k!}$

(2) (a) Find the 4th order Taylor polynomial (about $a = 0$) of $\cos(\sin x)$.

(b) Use the result of (a) (not l'Hospital's rule) to compute

$$\lim_{x\to 0} \frac{\cos(\sin x) - \cos x}{x^2 \sin(x^2)}\,.$$

(3) Find all values of x for which the following series (a) converges absolutely, (b) converges conditionally:

$$f(x) = \sum_{n=0}^{\infty} \frac{(-1)^n (x-3)^n}{n+2}\,.$$