Solutions for Test 2

I) a) Convergent, limit in ratio test is $1/2$.
I) b) Not convergent, limit in ratio test is $3/2$
I) c) Not convergent since $\lim_{n\to\infty} \left(\frac{k}{1+k}\right)^k = 1/e \neq 0$.

II) a) $N = 3$
II) b) Convergent on the whole real line.
II) c) Convergent on the interval $[-1, 1)$.

III) a) The value $9/10$ approximates the integral within $\frac{1}{9\cdot 4!}$.
III b)

$$\frac{1}{(1-x)^2} = \sum_{k=0}^{\infty} k x^{k-1} \ .$$

III) c) 9

IV)

$$y(x) = \frac{1}{8}x^2 + \frac{15}{8}\frac{1}{x^5}$$