(a) $\sum\limits_{n=0}^{\infty} n!(x-4)^n$ the ratio tested is preferable

$$r = \lim_{n\to\infty} \frac{|(n+1)!\,(x-4)^{n+1}|}{|n!(x-4)^n|} = |x-4| \lim_{n\to\infty} \frac{(n+1)!}{n!} = |x-4| \lim_{n\to\infty}(n+1)$$

$r > 1$ for all $x \neq 4$. So the series diverges on $(-\infty, 4)$ and $(4, $

$r < 1$ for $x = 4$ the series converges when $x = 4$.

(b) the series converge absolutely when $x = 4$

(c) has no value that is converges conditionally

(b) #1) $\sum\limits_{n=1}^{\infty} \frac{(x-2)^n}{n\cdot 5^n}$

$$r = \lim_{n\to\infty} \frac{|(x-2)^{n+1}/(n+1)\cdot 5^{n+1}|}{|(x-2)^n/n\cdot 5^n|}$$

$$= \lim_{n\to\infty} \frac{|x-2|}{5} \cdot \left|\frac{n}{n+1}\right| = \frac{|x-2|}{5} \lim_{n\to\infty}\left|\frac{n}{n+1}\right| = \frac{|x-2|}{5}$$

$r = \frac{|x-2|}{5} < 1$ $-3 < x < 7$

when $x = -3$ $\sum\limits_{n=1}^{\infty} \frac{(-1)^n}{n}$ converges   the interval of converges is

$-3 \leq x < 7$

when $x = 7$ $\sum\limits_{n=1}^{\infty} \frac{1}{n}$ diverges   the radius is $R = 5$

b). for $(-3, 7)$, the series converges absolutely

c) when $x = -3$, it is conditional convergence

Q2. (a) $\sum\limits_{n=0}^{\infty} \frac{x^n}{n!}$ $r = \lim_{n\to\infty} \frac{|x^{n+1}/(n+1)!|}{|x^n/n!|} = \lim_{n\to\infty} |x| \cdot \frac{n!}{(n+1)!} = |x| \lim_{n\to\infty}$

$$\left(\frac{1}{n+1}\right) = 0$$

$r = 0$, for all real number x, the series converges for all x