These are alleged answers. For each error herein, you get extra-credit points for being the first to report it by e-mail.

1 (a) Since $2 + (-1)^n \leq 3$, we have

$$\frac{2 + (-1)^n}{n^2} \leq \frac{3}{n^2},$$

so we can say that this series converges by comparison with convergent $\sum_{n=1}^{\infty} \frac{3}{n^2}$.

One could also try the limit comparison test:

$$\frac{2 + (-1)^n}{\frac{n^2}{1}} = \frac{2 + (-1)^n}{n^{1/2}} \rightarrow 0,$$

which again indicates convergence.

(b) Since $2 + (-1)^n > 1$, we have

$$\frac{2 + (-1)^n}{n} \geq \frac{1}{n},$$

so we can say that this series diverges by comparison with divergent Harmonic Series $\sum_{n=1}^{\infty} \frac{1}{n}$.

Probably one can get a limit compare with $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ to indicate divergence for you.

(c) A limit compare does this one nicely:

$$\frac{k - 3}{\sqrt[k]{k^8 - 37}} \frac{k^8/3}{1} \left( \frac{k - 3}{\sqrt[k]{k^8 - 37}} \right) \frac{1}{k^{5/3}} = \frac{k^{8/3} \left( 1 - \frac{3}{k} \right)}{k^{8/3} \sqrt[3]{1 - \frac{37}{k^8}}},$$

This last obviously goes to 1 as $k \rightarrow \infty$, so the given series converges by limit compare with convergent $\sum_{k=1}^{\infty} \frac{1}{k^{5/3}}$. 