11.7

12.) Since $0 < \frac{1}{k\sqrt{k^2+1}} < \frac{1}{k\sqrt{k^2}} = \frac{1}{k^2}$, and

$\sum_{k=1}^{\infty} \frac{1}{k^2}$ converges, $\sum_{k=1}^{\infty} \frac{1}{k\sqrt{k^2+1}}$ converges.

18.) Since $\lim_{n\to\infty} \frac{1}{\sqrt{n}-1} = 0$ and $\frac{1}{\sqrt{n+1}-1} < \frac{1}{\sqrt{n}-1}$,

by the Alternating Series Test, $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}-1}$

converges.

22.) Since $\frac{1}{3} \leq \frac{1}{2+\sin k}$, $\lim_{k\to\infty} \frac{1}{2+\sin k}$ (if it exists)

must be greater than or equal to $\frac{1}{3}$. Thus, by

the Test for Divergence, $\sum_{k=1}^{\infty} \frac{1}{2+\sin k}$ diverges.

16.) Since $\lim_{n\to\infty} \frac{\left(\frac{n^2+1}{n^3+1}\right)}{\left(\frac{1}{n}\right)} = \lim_{n\to\infty} \frac{n^3+n}{n^3+1} = 1$, and

$\sum_{n=1}^{\infty} \frac{1}{n}$ diverges, $\sum_{n=1}^{\infty} \frac{n^2+1}{n^3+1}$ Diverges.

28.) Since $\int_1^\infty \frac{e^{1/x}}{x^2}\,dx = \lim_{t\to\infty}\int_1^t \frac{e^{1/x}}{x^2}\,dx = \lim_{t\to\infty}\int_1^{\frac{1}{t}} -e^u\,du$

Let $u=\frac{1}{x}$.
Then, $du = \frac{-1}{x^2}dx$.

$= \lim_{t\to\infty} e^u \Big|_{\frac{1}{t}}^{1} = \lim_{t\to\infty} \left(e - e^{1/t}\right)$

$= e-1$, $\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$ converges.