Each problem is worth 5 points. For full credit provide complete justification for your answers.

1. Determine whether the series $\sum_{n=1}^{\infty} \frac{3}{2+5^n}$ converges or diverges.

\[
2 + 5^n > 5^n \\
\frac{1}{2 + 5^n} < \frac{1}{5^n} \\
\frac{3}{2 + 5^n} < \frac{3}{5^n}
\]

Since $\sum_{n=1}^{\infty} \frac{3}{2+5^n}$ is less than $\sum_{n=1}^{\infty} \frac{3}{5^n}$ which is a convergent geometric series, then according to the comparison test, $\sum_{n=1}^{\infty} \frac{3}{2+5^n}$ must converge.

Excellent!

2. Determine whether the series $\sum_{n=0}^{\infty} 4 \left( \frac{-3}{2} \right)^n$ converges or diverges.

Geometric series $\quad a = 4 \\
r = (\frac{-3}{2}) \\
|r| = \frac{3}{2} > 1$, so the series diverges.

Great!
3. Determine whether the series \( \sum_{n=1}^{\infty} \frac{n + 3}{n^2} \) converges or diverges.

\[
\lim_{n \to \infty} \frac{1}{n^2} = 0 \quad \lim_{n \to \infty} \frac{n}{n+3} = 1 \\
\frac{1}{n+3} \quad \text{is} \quad \frac{n}{n^2} \quad \text{must diverge as well, by the limit comparison test.}
\]

Nice job.