Homework 2.

6.18 Ratio $(2^{n+1}/(n+1)^2)/(2^n/n^2)$ tends to 2 as n tends to ∞; as $|2| > 1$ the series diverges.
6.21 Ratio of terms a_n/a_{n-1} is $5n^2/2n(2n-1)$ which tends to $5/4 > 1$ as $n \mapsto \infty$, so series diverges.
6.27 Ratio tends to 100; series diverges.
6.27 Compare with $\sum 1/2^n$; series converges.
6.34 Compare with $\sum n^2/n^4 = \sum 1/n^2$; series converges.
6.35 Compare with $\sum n^2/5n^4$ (noting that $\log(n)$ is much smaller than n for n large). Series converges.
7.2 Diverges because terms do not tend to 0.
7.3 Converges by alternating series test.
7.5 Converges by alternating series test.
7.6 Diverges because terms do not tend to 0.
9.1 Diverges by comparison with $\sum 1/n$.
9.3 Converges by integral test ($\int^\infty n^s dn$ converges for $s < -1$, and $-\log(3) < -1$).
9.7 Use ration test: $a_n/a_{n-1} = 2n(2n-1)/3n^2$ which tends to $4/3 > 1$ so series diverges.
9.14 Converges by alternating series test.
9.21 Note that $|a_n| < |a_0|/2^n$, so series converges by comparison with convergent series $\sum a_0/2^n$.
10.1 Converges for $-1 < x < 1$. (Geometric series.) Diverges for $|x| \geq 1$ as terms do not tend to 0.
10.3 Converges for $-1 \leq x \leq 1$ by comparison with $\sum 1/n^2$.
10.15 Converges for $|(x-2)/3| < 1$ as this is a geometric series, in other words for $-1 < x < 5$. Diverges otherwise.
10.19 Converges for $|(x^2-1)/8| < 1$, which is equivalent to $x^2 < 9$, in other words $|x| < 3$.
10.20 This is the series for $\exp(-2(x^2+1)^2)$ which converges for all x because the exponential series always converges.