This is the collection of limit problems from my last few exams.

1. (SHORT ANSWER, NO PARTIAL CREDIT, NO WORK NEED BE SHOWN)
   (a) $\lim_{n\to\infty}\left(1-\frac{2}{5n}\right)^{n/2}$
   (b) $\lim_{n\to\infty}\sqrt[n]{\frac{3n^2}{5n^4+3n^2+2}}$
   (c) $\lim_{n\to\infty}\frac{5^n}{n^2 3^n}$
   (d) $\lim_{n\to\infty}\frac{n!}{3^n}$
   (e) $\lim_{n\to\infty}\frac{(\ln(n))^3}{\sqrt{n}}$
   (f) $\lim_{n\to\infty}\frac{\ln(4n^2+1)}{\ln(3n)}$
2. (30 points) Compute the following limits.
   (a) $\lim_{\theta\to 0}\frac{(x^2+x)3^x}{3^x-1}$
   (b) $\lim_{x\to 0^+}\frac{\ln x}{\sin x+x}$
   (c) $\lim_{x\to 0}(e^x+x)^{1/x}$
3. (SHORT ANSWER, NO PARTIAL CREDIT, NO WORK NEED BE SHOWN)
   (a) $\lim_{n\to\infty}\sqrt[n]{n}$
   (b) $\lim_{n\to\infty}\sqrt[n]{n!}$
   (c) $\lim_{n\to\infty}\frac{1}{\sqrt[n]{5x^4+3x^2+2}}$
   (d) $\lim_{n\to\infty}\frac{3^n}{n^2 4^n}$
   (e) $\lim_{n\to\infty}\frac{100^n}{n!}$
   (f) $\lim_{n\to\infty}\frac{(\ln(n))^{12}}{n^{1.1}}$
   (g) $\lim_{n\to\infty}\frac{\ln(n+1)}{\ln(n)}$
4. Compute the following limits.
   (a) (5 points) $\lim_{\theta\to 0}\frac{3^{\sin(\theta)}-1}{\theta}$
   (b) (5 points) $\lim_{x\to 1^+}\left(\frac{1}{x-1}-\frac{1}{\ln x}\right)$
   (c) (10 points) $\lim_{x\to\infty}(x^2+3)^{1/\ln x}$