172 Test 2 Take Home

To be handed in nice and neat, no more that two questions per page:

1. For the sequence defined by $a_1 = 2, a_{n+1} = \dfrac{1}{3 - a_n}$
   (a) List the first 5 terms.
   (b) Assuming that the sequence is decreasing, show that it is bounded below by 0
   (c) Explain in clear English (briefly) why this means it must have a limit.
   (d) Find the limit $\lim_{n\to\infty} a_n$
2. Add:
   (a) $\displaystyle\sum_{n=0}^{\infty} \frac{3^n}{4^{n+1}}$
   (b) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(n+2)}$
3. Determine if the following converge, state explicitly what test is used:
   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^4+1}}$
   (b) $\displaystyle\sum_{n=1}^{\infty} \frac{n^3 2^n}{3^{n-1}}$
4. Find the interval of convergence for
$$\sum_{n=1}^{\infty} \frac{(-1)^n 2^n (x-1)^n}{n}$$
5. Write the Maclaurin series for $f(x) = xe^{-x}$
6. Find the Maclaurin series and the radius of convergence for $f(x) = \frac{1}{(1+x)^2}$