SHOW ALL WORK. Only exact values will be accepted. In finding series for expressions/functions below, you may use the definition of Taylor/Maclaurin series or modifying known series to come up with your answers.

1. For the following series, find the radius of convergence $R$, showing all work.
   
   (a) \[ \sum_{k=0}^{\infty} \frac{(k!)^2}{(2k)!}(z - 2)^k \]
   
   (b) \[ \sum_{k=0}^{\infty} (-1)^k z^{2k} \]

2. For the following functions, find a power series centered at $z_0 = 0$ and its radius of convergence $R$.
   
   (a) \[ f(z) = z^2 \cos z \]
   
   (b) \[ g(z) = \frac{z}{1 - 8z^3} \]

3. Find a “closed form” (that is, a simple expression/function) for the following power series.
   
   (a) \[ \sum_{n=0}^{\infty} \frac{z^{2n}}{n!} \]
   
   (b) \[ \sum_{n=1}^{\infty} n(z - 1)^{n-1} \]

4. Using the fact that \[ \frac{d}{dz} \tan^{-1} z = \frac{1}{1 + z^2} \], come up with a Maclaurin series for $\tan^{-1} z$ and state the radius of convergence $R$.

5. Find a Maclaurin series for $\log(1 - z)$, stating its radius of convergence.