2. [5 points] Suppose that the power series $\sum_{n=1}^{\infty} C_n (x+2)^n$ converges at $x = 4$ and diverges at $x = -10$. What can you say about the behavior of the power series at the following values of $x$?
   a. [1 point] At $x = 0$, the power series...  
      CONVERGES  DIVERGES  CANNOT DETERMINE
   b. [1 point] At $x = -8$, the power series... 
      CONVERGES  DIVERGES  CANNOT DETERMINE
   c. [1 point] At $x = 8$, the power series... 
      CONVERGES  DIVERGES  CANNOT DETERMINE
   d. [1 point] At $x = -4$, the power series... 
      CONVERGES  DIVERGES  CANNOT DETERMINE
   e. [1 point] At $x = 6$, the power series... 
      CONVERGES  DIVERGES  CANNOT DETERMINE

3. [7 points] A function $F(x)$ has Taylor series given by
   \[ F(x) = \sum_{n=0}^{\infty} \frac{(-1)^n(n+1)}{2^n(n^2+1)}(x-1)^{4n+1} \]
   Answer the following questions regarding the Taylor series:
   a. [3 points] Circle the appropriate answer. No work is needed, but partial credit may be given for correct work.
      At $x = 1$, $F$ is...  
      INCREASING  DECREASING  CANNOT DETERMINE
      \[ Solution: \] Using the Taylor series, 
      \[ F'(1) = \frac{(-1)^0(1)}{2^0(1)} = 1 > 0, \]
      so $F$ is increasing at $x = 1$.
   b. [4 points] What is $F^{(2021)}(1)$? Give your answer in exact form and do not try to simplify. Show your work.
      \[ Solution: \] Using the Taylor series, the term $(x-1)^{2021}$ appears when $n = 505$, so 
      \[ F^{(2021)}(1) = \frac{(-1)^{505}(505 + 1)}{2^{505}(505^2 + 1)} \]
      \[ F^{(2021)}(1) = \frac{-(506)(2021)!}{2^{505}(505^2 + 1)}. \]