

## 6. [12 points]

a. [6 points] For each of the following sequences or series described below, defined for  $n \geq 1$ , determine whether they must converge, must diverge, or whether there is not enough information. Circle your answers. No justification is required.

(i)  $a_n = (-1)^n(2 + k^{-n})$ , where  $k$  is a positive real number.

*Circle one:*      **Converges**      **Diverges**      **Not Enough Information**

(ii)  $b_n = \int_2^{n+3} f(x) dx$  where  $f(x)$  is a positive function, and the series  $\sum_{j=2}^{\infty} f(j)$  converges.

*Circle one:*      **Converges**      **Diverges**      **Not Enough Information**

(iii)  $c_n = P(e^n)$  where  $P(x)$  is a cumulative distribution function.

*Circle one:*      **Converges**      **Diverges**      **Not Enough Information**

b. [6 points] For each of the following sequences, defined for  $n \geq 1$ , decide whether the sequence is monotone increasing, monotone decreasing, or not monotone, and whether it is bounded or unbounded. Circle your answers. No justification is required.

(i)  $r_n = \cos(2\pi n) \left(\frac{5}{4}\right)^n$

*Circle all which apply:*

**Monotone Increasing**      **Monotone Decreasing**      **Not Monotone**  
**Bounded**      **Unbounded**

(ii)  $s_n = \frac{(-1)^n}{1 + \ln(n)}$

*Circle all which apply:*

**Monotone Increasing**      **Monotone Decreasing**      **Not Monotone**  
**Bounded**      **Unbounded**

(iii)  $t_n = \int_1^{n^3} 2^{-x} dx$

*Circle all which apply:*

**Monotone Increasing**      **Monotone Decreasing**      **Not Monotone**  
**Bounded**      **Unbounded**