- 6. [9 points] For each of the following questions, circle all answers that must be correct.
  a. [3 points] Circle all true statements. The integral ∫<sub>0</sub><sup>∞</sup> 1/(√x + x<sup>2</sup>) dx
  i. diverges because 1/(√x + x<sup>2</sup>) > 1/(2√x) for 0 < x < 1.</li>
  ii. diverges because 1/(√x + x<sup>2</sup>) > 1/(2x<sup>2</sup>) for 1 < x < ∞.</li>
  iii. converges because lim 1/(√x + x<sup>2</sup>) = 0.
  iv. converges by p-test with p = 2.
  v. None of these.
  - **b.** [3 points] Consider a geometric series with  $n^{th}$  partial sum  $S_n$ , where  $\lim_{n \to \infty} S_n = \frac{5}{1 0.3}$ . Which of the following statements must be true?
    - i. This geometric series must converge.
    - ii. The first term of this geometric series must be 0.3.
    - iii. The common ratio of this geometric series must be 0.3.
    - iv. This geometric series may or may not converge; it cannot be determined.
    - v. None of these.
  - **c.** [3 points] The series  $1 \frac{1}{3} + \frac{1}{2} \frac{1}{3^2} + \frac{1}{2^2} \frac{1}{3^3} + \frac{1}{2^3} \dots$ 
    - i. converges by the Alternating Series Test.
    - ii. diverges because the Alternating Series Test does not apply.
    - iii. neither converges nor diverges.
    - iv. converges because it is a geometric series with common ratio of magnitude less than 1.
    - v. converges because the terms converge to 0.
    - vi. None of these.