EXAM 3 - MATH 152 Your Name:_____

Friday, November 9 George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. Find the limits of the following sequences:
 - (a) $\{\arctan(2n)\}_{n=1}^{\infty}$

(b)
$$\left\{\frac{e^n + e^{-n}}{e^{2n} - 1}\right\}_{n=1}^{\infty}$$

2. Determine whether the following infinite series converge and, if yes, find their sum:

(a)
$$\sum_{n=1}^{\infty} \frac{n(n+2)}{\pi^2(n+3)^2}$$

(b)
$$\sum_{n=1}^{\infty} \left[\left(\frac{4}{5}\right)^{n-1} - \left(\frac{3}{10}\right)^n \right]$$

3. Use the method of telescoping series to determine the sum of the infinite series $\sum_{n=2}^{\infty} \frac{2}{n^2 - 1}$

4. The infinite series $\sum_{n=1}^{\infty} ne^{-n}$ has the property that its *n*-th term sequence consists of positve terms, is decreasing and its limit is zero. Use the integral test to determine whether the infinite series converges or diverges.

5. Find the radius and interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{(-2)^n}{\sqrt{n}} (x+1)^n$