EXAM 4 - MATH 152

DATE: Friday, December 3
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.
GOOD LUCK!!

1. Determine whether the following sequences converge and if so find the limits (**rigorous explanations required in all problems**):

$$(a)\ \{\sin(\pi n)\}_{n=1}^{\infty} \qquad (b)\ \{\ln(\frac{1}{n})\}_{n=1}^{\infty} \qquad (c)\ \{\sqrt{4n^2+7n}-2n\}_{n=1}^{\infty}$$

2. Determine if the series converges and if so find its sum:

$$(a)\ \sum_{k=1}^{\infty}\frac{1}{k^2-1} \qquad (b)\ \sum_{k=5}^{\infty}\frac{4^{k+2}}{7^{k-1}}$$

3. Determine whether the given series converges:

$$(a)\ \sum_{k=1}^{\infty}k^{-\pi/e} \qquad (b)\ \sum_{k=1}^{\infty}\frac{k^5+1}{k^5+5k^3+k^2+7} \qquad (c)\ \sum_{k=1}^{\infty}k^2e^{-k^3}$$

4. Determine whether the given series converges:

$$(a)\ \sum_{k=1}^{\infty}(\frac{k}{k+1})^{k^2} \qquad (b)\ \sum_{k=0}^{\infty}\frac{(k+4)!}{4!k!4^k} \qquad (c)\ \sum_{k=1}^{\infty}\frac{1}{3k+7}$$

5. Classify the following series as absolutely convergent, conditionally convergent or divergent:

$$(a)\ \sum_{k=1}^{\infty}\frac{(-4)^k}{k^2} \qquad (b)\ \sum_{k=1}^{\infty}\frac{(-1)^k}{\sqrt{k(k+1)}}$$

6. Find the radius of convergence and the interval of convergence of the following series:

$$\sum_{k=1}^{\infty}\frac{x^k}{k(k+1)}$$