MATH 132 **EXAM III** FALL 2014

This exam has 18 questions. Part I will have 16 multiple choice questions, 5 points each. Part II will have 2 hand graded questions, 10 points each. Please check to see that your exam is complete. If you do not have a **pencil** to mark your card, please borow one from your proctor. **One page with formulas is attached to the end of this booklet.** Write your **ID NUMBER** (not your SS number) on the six blank lines on the top of your answer card, using one blank for each digit. After being sure of which answer you think is right, **shade in the corresponding box on your card.**

1) Use $\int \frac{du}{\sqrt{a^2+u^2}} = sinh^{-1}(\frac{u}{a}) + C$, for $a > 0$, $sinh^{-1}(x) = ln(x + \sqrt{x^2+1})$, to solve the integral $\int_0^{\sqrt{3}} \frac{1}{\sqrt{1+x^2}}\, dx$.

A) $ln(\sqrt{3}+1)$ B) $ln(\sqrt{3}+2)$ C) $ln(\sqrt{3}+4)$ D) $ln(\sqrt{3}+\sqrt{2})$ E) $ln(2\sqrt{3})$
F) $ln(3\sqrt{3})$ G) $ln(4)$ H) $ln(5)$ I) $ln(7)$ J) $ln(5\sqrt{3})$

2) Find the **limit** of the **sequence** $\left\{(\frac{n+1}{2n})(1-\frac{1}{n})\right\}_{n=1}^{\infty}$, if it converges .

A) 0 B) 1 C) $\frac{1}{2}$ D) $\frac{3}{2}$ E) $\frac{1}{3}$ F) 2 G) $\frac{2}{3}$ H) $\frac{4}{3}$ I) $\frac{1}{4}$ J) diverges

3) Find the sum of the series $\left\{ \frac{4}{9} + \frac{4}{27} + \frac{4}{81} + \frac{4}{243} + \dots \right\}$ if it converges.

A) $\frac{5}{9}$ B) $\frac{7}{93}$ C) $\frac{10}{9}$ D) $\frac{3}{4}$ E) $\frac{5}{4}$ F) $\frac{7}{4}$ G) $\frac{2}{3}$ H) $\frac{4}{3}$ I) $\frac{5}{3}$ J) *diverges*

4) Which of the following three series is/are **convergent** ?

I) $\sum_{n=1}^{\infty} \frac{n+2}{n^{3/2}}$ II) $\sum_{n=2}^{\infty} \frac{\ln(n)}{n^2}$ III) $\sum_{n=1}^{\infty} \frac{n}{\sqrt{1+n^2}}$

A) *I* B) *II* C) *III* D) *I & II* E) *I & III* F) *II & III* G) *I, II* & III H) all diverge

5) Which of the following three series is/are **convergent** ?

I) $\sum_{n=2}^{\infty} \frac{1}{n\ln(n)}$ II) $\sum_{n=2}^{\infty} \frac{\ln(n)}{n}$ III) $\sum_{n=1}^{\infty} \frac{\sin^2(n)}{n\sqrt{n}}$

A) *I* B) *II* C) *III* D) *I & II* E) *I & III* F) *II & III* G) *I, II* & III H) all diverge

6) If $S = \sum_{n=1}^{\infty} \frac{1}{n^3}$ *and* $S_{10} = \sum_{n=1}^{10} \frac{1}{n^3}$ (10^{th} partial sum) then using the **remainder estimate** of the **integral test**, we know that $R_{10} = (S - S_{10})$ is $\leq$:

A) 0.01 B) 0.001 C) 0.002 D) 0.03 E) 0.004 F) 0.05 G) 0.005 H) 0.06 I) 0.007