Math 181 – Spring 2011 Name: ______________________

Second Hour Exam

(20 pts) **1.**(a) Find the Taylor polynomial $T_2(x)$ of degree 2 for $\ln(x)$ at $a = 1$.

(b) Use the Taylor polynomial from part (a) to estimate $\ln(1.1)$.

(c) Use the Error Bound to show that $|T_2(1.1) - \ln(1.1)| \leq \dfrac{1}{3000}$.

(15 pts) **2.** Find the area of the surface of revolution of $y = 2x - 1$ about the x-axis over the interval $1 \leq x \leq 3$.

(20 pts) **3.**(a) Show that $\displaystyle\int_1^{+\infty} \frac{dx}{x^7 + 1}$ converges.

(b) Show that $\displaystyle\int_9^{+\infty} \frac{dx}{\sqrt{x} - 2}$ diverges.

(c) Determine whether $\displaystyle\int_0^{+\infty} e^{-x^4}\,dx$ converges or diverges. Justify your answer.

(15 pts) **4.** Find the centroid of the semicircular region bounded by $y = \sqrt{4 - x^2}$ and the x-axis.

(20 pts) **5.** Determine whether each series is convergent or divergent. Justify your answers.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n}{e^n}$

(b) $\displaystyle\sum_{n=3}^{\infty} \frac{n^2 - 7}{n^2 + 1}$

(10 pts) **6.** Compute the sum of each series. Express each answer in the form $\dfrac{a}{b}$ where a, b are integers.

(a) The geometric series $\dfrac{1}{2} - \dfrac{1}{4} + \dfrac{1}{8} - \dfrac{1}{16} + \cdots$

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{2^{3n}}{3^{2n+3}}$

Hand in this sheet along with your exam booklet!