Math 232 Exam 2   April 17, 2013   Professor Ilya Kofman

NAME: _____

Justify answers and show all work for full credit!

1. Evaluate $\int_1^\infty \dfrac{1}{(5x-1)^3}\, dx$

2. Does the series $\sum\limits_{n=1}^\infty \dfrac{7n^2}{n!}$ converge or diverge? Justify your answer.

3. Does the series $\sum\limits_{n=1}^\infty \dfrac{1}{3n^2-n}$ converge or diverge? Justify your answer.

4. Use the **integral test** to check if $\sum\limits_{n=1}^\infty \dfrac{5n}{n^2+3}$ converges or diverges.

5. **(a)** Show $\sum\limits_{n=0}^\infty \dfrac{(-1)^{n+1}\,2^{n+3}}{3^{n+1}}$ converges. **(b)** Find the sum for this series.

6. Find the interval of convergence for the series $\sum\limits_{n=0}^\infty \dfrac{(x-3)^n}{5n+1}$.

7. Suppose that $\sum\limits_{n=1}^\infty c_n(x-1)^n$ converges when $x=-3$ and diverges when $x=6$. For each of the following series, determine whether it must converge, must diverge, or either convergence or divergence is possible. Do NOT justify.

   (a) $\sum\limits_{n=1}^\infty c_n 4^n$ **(b)** $\sum\limits_{n=1}^\infty c_n(-1)^n 4^n$ **(c)** $\sum\limits_{n=1}^\infty c_n(-1)^n 5^n$ **(d)** $\sum\limits_{n=1}^\infty c_n 6^n$

8. Find a power series that represents $f(x)=\dfrac{1}{e^{x^2}}$.
   (a) Give first 4 terms of the series. **(b)** Give the series using Σ notation.

9. Evaluate the integral as an infinite series, $\int \dfrac{\cos x - 1}{x^2}$.
   (a) Give first 4 terms of the series. **(b)** Give the series using Σ notation.

10. Find the Taylor series at $a=2$ for $f(x)=\dfrac{1}{x}$.
    (a) Give first 4 terms of the series. **(b)** Give the series using Σ notation.