Math 222, Section 5
Exam III Review
4/25/14

Name: ________________________________

<table>
<thead>
<tr>
<th>Problem</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
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<td>20</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
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**NOTE:** I need to see all of your work for each problem. Unjustified work will receive little or no credit.
1. (20 points) Find the Taylor series of $f(x) = \sqrt{x}$ centered at $a = 16$. Also find the radius of convergence.
2. (20 points) Find the 4th degree Taylor polynomial for \( f(x) = \sin(x) \) centered at \( \pi/6 \). Use Taylor’s inequality to estimate the accuracy of the approximation on the interval \( 0 \leq x \leq \pi/3 \).
3. (20 points) Find the Taylor series (centered at 0) for $f(x) = (1 - 3x)^{-5}$. (You may either do this directly or use the binomial theorem). Also, compute the radius of convergence.
4. (20 points) Determine whether each of the series is absolutely convergent.

(a) \[ \sum_{n=1}^{\infty} (-1)^n \frac{n}{\sqrt{n^2+2}}. \]

(b) \[ \sum_{n=2}^{\infty} \left( -\frac{2n}{n+1} \right)^{5n}. \]

(c) \[ \sum_{n=2}^{\infty} (-1)^n \frac{\sqrt{n}}{\ln n}. \]
5. (20 points)
(a) Determine the power series representation of \( f(x) = \frac{1}{(1-x)^2} \).

(b) Use your answer from part (a) to evaluate the infinite series
\[
1 + 2/9 + 3/9^2 + 4/9^3 + 5/9^4 + \ldots
\]