MATH143-01 Exam One Spring 2009

You may keep this page of questions. Turn in your answers with all of your work on the colored paper.

**NO CALCULATORS ARE ALLOWED FOR THIS EXAM.**

(1) 10 Points. Write down the abstract partial fractions decomposition for

\[
f(x) = \frac{5x^7 - x^6 + 8x^3 - 19\pi}{(x - 2)(x + 7)^3(x^2 + 17)(x^2 - 6x + 61)^2}.
\]

Evaluate the following antiderivatives.

(2) 12 Points. \(\int x^5 \ln x \, dx\).

(3) 12 Points. \(\int \sin^3 \theta \cos^3 \theta \, d\theta\).

(4) 18 Points. \(\int \frac{x^2 - 18x + 25}{(x + 2)(x^2 + 9)} \, dx\).

(5) 16 Points. \(\int x^3 \cos(kx) \, dx\). Assume that \(k \neq 0\).

(6) 18 Points. Find the exact area of the region in the \(xy\)-plane that is bounded by \(y = \frac{1}{(x^2 + 4)^2}\), \(y = 0\), \(x = 0\) and \(x = \sqrt{5}\).

(7) 14 Points. Using the table for \(f(x)\) below, find the numerical approximations \(R_4, L_4, T_4, M_4\) and \(S_4\) for the integral \(\int_3^5 f(x) \, dx\).

<table>
<thead>
<tr>
<th>(x)</th>
<th>3.00</th>
<th>3.25</th>
<th>3.50</th>
<th>3.75</th>
<th>4.00</th>
<th>4.25</th>
<th>4.50</th>
<th>4.75</th>
<th>5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f(x))</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>9</td>
<td>7</td>
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<td>3</td>
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