1. Differentiate $e^x (\cos x + \sin x)$.
2. Differentiate $\ln(\sqrt{873} \sin x)$.
3. Find $\frac{d}{dx}(x^3 \ln x)$.
4. Differentiate $x^{(1/x)}$.
5. A table of values for $f(x)$, $g(x)$, $f'(x)$ and $g'(x)$ is given. If $h(x) = f(g(x))$, find $h'(1)$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
<th>$g(x)$</th>
<th>$f'(x)$</th>
<th>$g'(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

6. Find $dy/dx$ if $y = \sin(x + y)$.
7. If $xyz = 6$, $dx/dt = 5$ and $dy/dt = 4$, find $dz/dt$ when $x = 1$ and $y = 2$.
8. The radius of a circular disk is measured to be 20cm with a possible error of .2cm. Estimate the possible error in computing the area of the disk.

9. Use the guidelines of section 4.5 to sketch the graph of $x\sqrt{4-x^2}$.
10. Find

$$\lim_{x \to 1} \frac{\ln x}{\pi/4 - \tan^{-1} x}$$

11. Find

$$\lim_{x \to 1} \frac{\ln x}{\pi/3 - \tan^{-1} x}.$$

12. Find

$$\lim_{x \to \infty} (\ln(2x - 1) - \ln(x)).$$

13. Find all local and absolute minima and maxima of the function $f(x) = 2\sqrt{|x|} + x$ on $[-4, 4]$.

14. If $f(x)$ is continuous on $[0, 3]$, differentiable on $(0, 3)$, and $f(0) = 2$, $f(3) = -1$, which of the following are necessarily true?
   (a) $f'(x) < 0$ for every point $x$ in $(0, 3)$.
   (b) $f'(x) < 0$ for at least one point $x$ in $(0, 3)$.
   (c) The function $f$ is decreasing on $[0, 3]$.
   (d) $f'(x) = -1$ for at least one point $x$ in $(0, 3)$.