You should take all derivatives and perform all non-trivial algebra on your calculator ... to earn full credit you
must outline your work and show the steps in a manner consistent with that demonstrated and discussed
during lecture. That includes, but is not limited to, completely simplifying all derivative formulas.

You may work on this assignment with your classmates or anybody else you please. You may get help from
a tutor or even the instructor. What you may not do is simply copy somebody else’s work – that completely
obviates the purpose of the assignment. If you forget to complete the assignment before it is due, do not
simply copy someone else’s paper and turn that in ... that is not “working together,” that is taking credit for
somebody else’s work.

1. Find the stationary numbers of the function \( f(x) = (x - 8)\sqrt{x + 6} \). Perform a second derivative
test at each of those numbers, and state appropriate conclusions.

\[
\frac{\text{d}f}{\text{d}x} = \frac{3x + 4}{2\sqrt{x+6}}
\]

\[
\frac{\text{d}^2f}{\text{d}x^2} = 0 \quad \text{only at } x = -4/3, \quad \text{so } -4/3 \text{ is } f’’ \text{ 0 \ so }
\]

\[
\text{Stationary number.}
\]

\[
\frac{\text{d}^3f}{\text{d}x^3} (-4/3) = 3\sqrt{6}/28
\]

So the only stationary number of \( f \) is \(-4/3\). Since

\[
f’(-4/3) = 0 \quad \text{and} \quad f”(-4/3) > 0, \quad \text{we know that}
\]

\( f \) has a local minimum point at \(-4/3\).
2. Use appropriate calculus-based techniques to find the absolute minimum value of the function \( k(x) = x^{\frac{3}{2}}(x-7)^2 \) over the interval \([3,9]\).

\[ k' (x) = \frac{5x-21}{3(x-7)^{1/2}} \]

By inspection, the critical numbers of \( k \) are 4.2 and 7, both of which lie in \((3,9)\).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( K(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>7.560</td>
</tr>
<tr>
<td>4.2</td>
<td>8.344</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>14.287</td>
</tr>
</tbody>
</table>

As seen in Table I, the absolute minimum value of \( K \) over \([3,9]\) is 0.

A gentle reminder ...
If you forget to complete the assignment before it is due, do not simply copy someone else’s paper and turn that in ... that is not “working together,” that is taking credit for somebody else’s work. You should plan on getting this assignment done at least 24 hours before it is due.