Math 113: Quiz 7

Instructions: Answer all questions. Show all of your work. Partial credit may be given. The use of calculators is not allowed. Please turn off and put away all mobile electronic devices - accessing these devices between the time you receive your quiz and the time you turn in your quiz constitutes an honor code violation.

1. (4 pts) Use the First Derivative Test to find the local max and local min values of \( f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x - 4 \).

\[
\begin{align*}
f'(x) &= x^2 - 3x + 2 = (x-2)(x-1) \\
x = 1 & \quad \text{critical points} \\
x = 2 & \\
\end{align*}
\]

\[
\begin{align*}
\text{local max of } f & \text{ at } x = 1 \\
\text{local min of } f & \text{ at } x = 2 \\
\end{align*}
\]

2. (4 pts) Use the Second Derivative Test to find the local max and local min values of \( f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x - 4 \).

\[
\begin{align*}
f''(x) &= 2x - 3 \\
f''(1) &= -1 < 0 \\
f''(2) &= 1 > 0 \\
\end{align*}
\]

\[
\begin{align*}
f &\text{ has local max at } x = 1 \\
f &\text{ has local min at } x = 2 \\
\end{align*}
\]

3. (2 pts) Suppose you have a function for which \( f'(x) = x(x - 10)^2 \). Which is larger, \( f(0) \) or \( f(10) \), or are they both the same?

\[
\begin{align*}
f' > 0 \\
0 & \quad \text{ and } \\
10 & \\
\end{align*}
\]

\[
\begin{align*}
f &\text{ increases between } f(0) \text{ and } f(10) \\
\therefore f(10) &\text{ is larger than } f(0) \\
\end{align*}
\]