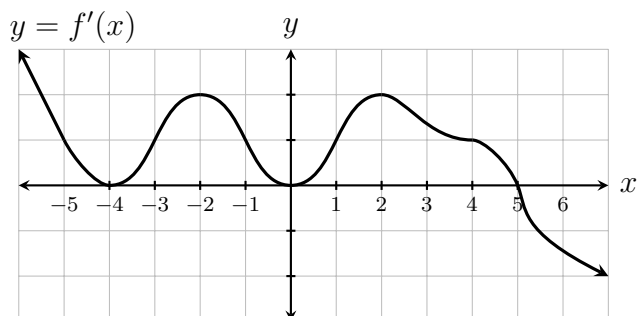1. (10 points) Use the second derivative test to find the local extrema of $f(x) = \dfrac{x^3}{3} + x^2 + 1$.

2. (10 points) The graph of the **derivative** $f'(x)$ of a function $f(x)$ is shown below. Answer the following questions about the function $f(x)$.

    (a) State the critical points of f.

    (b) State the interval(s) on which f increases.

    (c) State the interval(s) on which f decreases.

    (d) State the intervals on which f is concave up.

    (e) State the intervals on which f is concave down.

1. (10 points) Use the second derivative test to find the local extrema of $f(x) = xe^x$.

2. (10 points) The graph of the **derivative** $f'(x)$ of a function $f(x)$ is shown below. Answer the following questions about the function $f(x)$.

   (a) State the critical points of f.

   (b) State the interval(s) on which f increases.

   (c) State the interval(s) on which f decreases.

   (d) State the intervals on which f is concave up.

   (e) State the intervals on which f is concave down.