

Math 2215 - Calculus 1

Quiz #14 - 2017.10.09

Solutions

Compute the intervals of increase and decrease for the function $f(x) = \frac{1}{5}x^5 - \frac{3}{4}x^4 + \frac{2}{3}x^3 + 3$.

First we compute the derivative:

$$f'(x) = x^4 - 3x^3 + 2x^2$$

Then we factor:

$$f'(x) = x^2(x-1)(x-2)$$

So there are critical points at $x = 0$, $x = 1$, and $x = 2$. Since $x^2 > 0$ for $x \neq 0$, only the $(x-1)(x-2)$ product determines the sign of $f'(x)$. Since $(x-1)(x-2)$ is a parabola opening up, it is negative between $x = 1$ and $x = 2$.

Therefore, the interval of decrease (where the derivative is negative) is $(1, 2)$, while the intervals of increase are what's left, which is $(-\infty, 0) \cup (0, 1) \cup (2, \infty)$.