For the function $f(x) = \frac{e^x}{x^2}$. Find the intervals of increase and decrease. Find the local maximum and minimum points.

Increasing/Decreasing Test Theorem

let f be a function that is continuous on the closed interval [a, b] and differentiable on the open interval (a, b).

1. if f '(x) > 0 for all x in (a, b), then f is increasing on [a, b].

2. if f '(x) < 0 for all x in (a, b), then f is decreasing on [a, b].

$f'(x) = -\frac{2e^x}{x^3} + \frac{e^x}{x^2} = \frac{e^x}{x^2}\left(1 - \frac{2}{x}\right)$

$f'(x) = 0$ or $f'(x) = \infty$

$1 - \frac{2}{x} = 0$ therefore $x = 2$ or $x = 0$

For $x < 0$ $f'(x) > 0$ - interval of increase

For $0 < x < 2$ $f'(x) < 0$ - interval of decrease

For $x > 2$ $f'(x) > 0$ - interval of increase

Local maximum and minimum points at $f'(x) = 0$, therefore $x = 2$

$f(2) = \frac{e^2}{4}$ and obviously $f(2) < f(10)$ therefore $x = 2$ – local minimum.

Answer: $x < 0$ and $x > 2$ - intervals of increase, $0 < x < 2$ - interval of decrease; $x = 2$ – local minimum.