Conditions

Suppose f(x)=(8-5x)e^x
(critical number: 3/5)
B) use interval notation to find where f(x) is increasing and decreasing
C) Use interval notion where f(x) is concave up and concave down
D) List values of inflection

Solution

Let's analyze the intervals of increasing and decreasing:

$$f'(x) = 8e^x - 5e^x - 5xe^x = e^x(3 - 5x)$$

We can really see, that the critical number is 3/5.

From the left side of this point, the derivative is positive, so our function is increasing there.

From the right side – the opposite situation.

We can make a conclusion, that f(x) increasing at:

$$x\epsilon(-\infty, \frac{3}{5})$$

Decreasing at:

$$x\epsilon(\frac{3}{5}, \infty)$$

The information about where is our function concave up or down can give us the 2nd derivative:

$$f''(x) = 3e^x - 5e^x - 5xe^x = -e^x(2 + 5x)$$

The critical value is -2/5. From the right side of this value, the derivative is negative, so the function is concave up. From the left side – the opposite situation.

We can make a conclusion, that f(x) concave up at:

$$x\epsilon(-\frac{2}{5}, \infty)$$

Concave down at:

$$x\epsilon(-\infty, -\frac{2}{5})$$

The only value of inflection is the point -2/5