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9. Let $f(x) = xe^{3x}$. Where is $f(x)$ increasing, decreasing, concave up, and concave down? Find the local maxima, local minima, and points of inflection of $y = f(x)$. Graph $y = f(x)$.

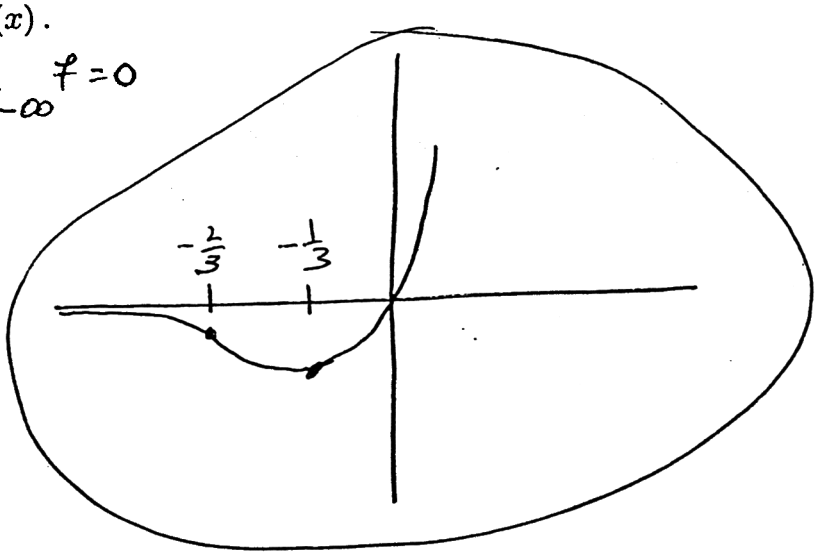
$f' = 3xe^{3x} + e^{3x}$

$= e^{3x}(3x+1)$

$f'' = 3e^{3x} + 3e^{3x}(3x+1)$

$= 3e^{3x}(3x+2)$

$\lim_{x \to -\infty} f = 0$



f' neg | f' pos

$-\frac{1}{3}$

f'' neg | f'' pos

$-\frac{2}{3}$

f is inc for $-\frac{1}{3} < x$

f is dec for $x < -\frac{1}{3}$

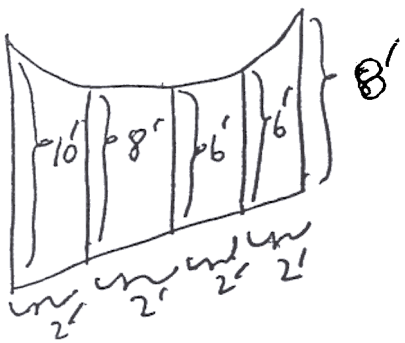
f is c.u. for $-\frac{2}{3} < x$

f is c.d for $x < -\frac{2}{3}$

$(-\frac{1}{3}, f(-\frac{1}{3}))$ loc. min

$(-\frac{2}{3}, f(-\frac{2}{3}))$ Pt of

10 Use Simpson's rule to estimate the area of the following shape.



$\text{Area} \approx \frac{2}{3}[10 + 4(8) + 2(6) + 4(6) + 8]$ ft^2