(5.) (3pts) [Another derivative.... No need to simplify, but show *all* of your work, & **circle** your answer.]

Find the derivative of $r(w) = e^{5w}(w^2-4)^3$.

[ok to here.]

$$r'(w) = 5e^{5w}(w^2-4)^3 + 3e^{5w}(w^2-4)^2(2w)$$

or

$$= e^{5w}(w^2-4)^2\left[5(w^2-4) + 6w\right]$$

$$= e^{5w}(w^2-4)^2\left[5w^2+6w-20\right]$$

(6.) A gas leak is discovered in a large municipal building. The rate at which gas is leaking into the building is increasing, as indicated in the table below.

Time (hours)	0	7	14	21	28	35
Rate (grams/hour)	125	127	132	140	153	171

Initially there is no gas in the building. Suppose the building is well sealed so that no gas escapes from it.

(a) **(6 pts.)** Determine lower and upper estimates for the amount of gas in the building after 21 hours.

Lower: $125(7) + 127(7) + 132(7) = 2688$ gms

Upper: $127(7) + 132(7) + 140(7) = 2793$ gms

(b) **(4 pts.)** How often would the rate need to be measured over the interval from $t = 0$ to $t = 35$ in order to find upper and lower estimates within 100 grams of the actual amount of gas in the building?

low $(171-125)\Delta t \leq 100$

$\longrightarrow \quad \Delta t \leq \frac{100}{46} \approx 2.17$.

Measurements should be made every ~ 2 hours & 10 minutes in order to have estimates within 100 gms.