(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 stop.]

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

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.