2016Q4

(a) $P(\text{success on 1 launch}) = 1 - P(\text{failure}) = 1 - .15 = .85$

$P(\text{30 successes}) = (.85)^{30} = \boxed{.00763}$

(b) $P(\text{failure on 31st or 32nd launch} \mid \text{first 30 success}) = \dfrac{(.85)^{30}(.15) + (.85)^{31}(.15)}{(.85)^{30}}$

$= \dfrac{.00021175357}{.00763307596} = \boxed{.2775}$

— or —

numerator is: $\text{geometpdf}(.15, 31) + \text{geometpdf}(.15, 32)$ (P(failure) X, P(failure) X)

denominator is: $\text{binompdf}(30, .85, 30)$ (n, P(success))

(c) If probability of single launch ignitor failure is really 0.15, then part a probability of .00763 is how likely 30 successes in a row would occur by chance. There is very low ($< \alpha = .05$) so this suggests that the ignitor failure rate is likely lower than .15.