Using and Interpreting Fitted Logistic Regression Models

On April 15, 1912, the ocean liner RMS *Titanic* sunk on her maiden voyage after striking an iceberg; approximately 1,500 passengers and crew lost their lives in the accident. The output below shows the R summary table for the fitted logistic regression model of survival as a function of passenger age (measured in decades), fit to 756 Titanic passengers.

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              Estimate Std. Error    z value   Pr(>|z|)
(Intercept) -0.08142783 0.17386170 -0.4683483 0.63953556
Age         -0.00879462 0.00523158 -1.6810637 0.09275054
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1. Write down both the logit and logistic forms of the fitted logistic regression model, clearly identifying which is which.

2. What are the odds of survival for 20-year-old passengers? The corresponding probability?

3. What is the probability of dying for 30-year-old passengers?

4. Interpret the coefficient for age in context.

5. Interpret the coefficient for **a ten-year increase in age** in context.

6. The odds ratio is (infamously) easy to misinterpret. Each of the statements below contains an incorrect interpretation of the fitted logistic regression model from the Titanic. Using, for example, information about 20-year-old and 30-year-old passengers, construct counter-examples that show the "interpretation" in each statement is false.
   a. A ten-year increase in age is associated with a 0.916 decrease in the odds of survival.

   b. A ten-year increase in age is associated with a 0.916 decrease in the probability of survival.

   c. A ten-year increase in age is associated with a 0.916 times change (8.4% decrease) in the likelihood of survival.