

Name:

Quiz 1  
September 11, 2013

1. **(2 pts)** Define a *conjugate prior*.
2. **(3 pts)** A negative binomial distribution is used to model the number of failures  $x$  in a sequence of Bernoulli trials before a specified number of successes  $r$  are observed. The probability mass function for the negative binomial distribution is  $P(X = x) = \binom{x+r-1}{x} (1-p)^x p^r$ . What is the conjugate prior for  $p$ ?

3. **(3 pts)** Fisher's information measure is defined as  $I(\theta) = -E \left[ \frac{\partial^2 \log(f(y | \theta))}{\partial \theta^2} \right]$ . What is the Jeffreys' prior for the negative binomial distribution? The expected value for the negative binomial distribution is  $E[X] = r \frac{(1-p)}{p}$ .

4. **(2 pts)** Define *elicitation* and describe what it means to do elicitation well.