Name _____ Score _____ Teacher _____ Date _____

Normal Conjugate Priors

The unknown mean has a normal prior and observations have known variance. Add precisions: prior precision 1/tau^2 and data precision n/sigma^2. Use the supplied sample mean and keep variance distinct from standard deviation.

1. **Prior theta ~ N(4, 2). A sample of n=2 observations has mean 1; each observation has known variance 8. Find the posterior and compare its mean and variance with the prior and data.**

Given: The sample mean has variance observation variance divided by n, so its precision is n/sigma^2.

2. **Prior theta ~ N(5, 4). A sample of n=3 observations has mean 3; each observation has known variance 1. Find the posterior mean and variance.**

Given: The sample mean has variance observation variance divided by n, so its precision is n/sigma^2.

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Normal Conjugate Priors

The unknown mean has a normal prior and observations have known variance. Add precisions: prior precision 1/tau^2 and data precision n/sigma^2. Use the supplied sample mean and keep variance distinct from standard deviation.

3. **Prior theta ~ N(6, 8). One observation x=6 has known variance 2. Find the posterior mean and variance.**

Given: The second normal parameter shown is variance. Observation variance is known.

4. **Prior theta ~ N(1, 1); observations 18, 20 each have known variance 4. Update sequentially and verify the batch result.**

Given: Observations are conditionally independent given theta.

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Normal Conjugate Priors

The unknown mean has a normal prior and observations have known variance. Add precisions: prior precision 1/tau^2 and data precision n/sigma^2. Use the supplied sample mean and keep variance distinct from standard deviation.

5. **Prior theta ~ N(2, 2). A sample of n=6 observations has mean 3; each observation has known variance 8. Find the posterior mean and variance.**

Given: The sample mean has variance observation variance divided by n, so its precision is n/sigma^2.

6. **Prior theta ~ N(3, 4). A sample of n=2 observations has mean 5; each observation has known variance 1. Find the posterior and compare its mean and variance with the prior and data.**

Given: The sample mean has variance observation variance divided by n, so its precision is n/sigma^2.

Name _____ Score _____ Teacher _____ Date _____

Normal Conjugate Priors

The unknown mean has a normal prior and observations have known variance. Add precisions: prior precision 1/tau^2 and data precision n/sigma^2. Use the supplied sample mean and keep variance distinct from standard deviation.

7. **Prior theta ~ N(4, 8). One observation x=3 has known variance 2. Find the posterior mean and variance.**

Given: The second normal parameter shown is variance. Observation variance is known.

8. **Prior theta ~ N(5, 1); observations 22, 24 each have known variance 4. Update sequentially and verify the batch result.**

Given: Observations are conditionally independent given theta.