Our features are:

1. Local Price
2. Bathrooms
3. Land Area
4. Living area
5. # Garages
6. # Rooms
7. # Bedrooms
8. Age of home

And we have that our class probabilities are:

$$P(y = \text{Apartment}) = \frac{7}{20} = 0.35$$

$$P(y = \text{House}) = \frac{7}{20} = 0.35$$

$$P(y = \text{Condo}) = \frac{6}{20} = 0.3$$

The equation for our normal distribution is:

$$P(x_j \mid C = c_i) = \frac{1}{\sqrt{2\pi\sigma_{ji}}} \exp\left[-\frac{(x_j - \mu_{ji})^2}{2\sigma_{ji}^2}\right]$$

1. Local Price:

Let's start with the "Apartment" class:

$$\mu = (4.9176 + 4.5573 + 5.0597 + 14.4598 + 5.0500 + 8.2464 + 9.0384)/7$$

$$\mu = \frac{51.3292}{7} = 7.333$$

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2} = 3.348 \quad \text{and} \quad \sigma^2 = 11.208$$

$$P(x = \text{Local Price} \mid c = \text{Apartment}) = \frac{1}{\sqrt{2\pi \times 3.348}} \times \exp\left[-\frac{(x_j - 7.333)^2}{2 \times 11.208}\right]$$

$$= 0.5836 \times \exp\left(-0.0446 \times (x_j - 7.333)^2\right)$$

Computing the conditional probability for "House"

$$\mu = \frac{1}{7}(5.0208 + 5.6039 + 5.8282 + 5.3003 + 6.2712 + 5.6039 + 6.6969)$$

$$= 5.76$$

$$\sigma = 0.528 \quad \text{and} \quad \sigma^2 = 0.279$$

$$P(x = \text{Local Price} \mid c = \text{House}) = \frac{1}{\sqrt{2\pi \times 0.528}} \times \exp\left[-\frac{(x_j - 5.76)^2}{2 \times 0.279}\right]$$

$$= 0.5485 \times \exp\left(-1.792 \times (x_j - 5.76)^2\right)$$

Computing the conditional probability for "Condo"

$$\mu = \frac{1}{6}\left[4.5425 + 3.8910 + 5.8980 + 16.4202 + 5.9592 + 7.7841\right]$$

$$= 7.4159$$

$$\sigma^2 = 17.719, \quad \sigma = 4.209$$

$$P(x = \text{Local Price} \mid c = \text{Condo}) = \frac{1}{\sqrt{2\pi \times 4.209}} \times \exp\left[-\frac{(x_j - 7.4159)^2}{2 \times 17.719}\right]$$

$$= 0.1944 \times \exp\left(-0.0282 \times (x_j - 7.4159)^2\right]$$

2. Bathrooms

Computing the conditional probability for "Apartment"

$$\mu = \frac{1}{7}(1+1+1+2.5+1+1.5+1)$$

$$= 1.2857$$

$$\sigma^2 = 0.2755 \quad , \quad \sigma = 0.5249$$

$$P(x = \text{Bathrooms} \mid c = \text{Apartment}) = \frac{1}{\sqrt{2\pi \times 0.5249}} \times \exp\left[-\frac{(x_j - 1.2857)^2}{2 \times 0.2755}\right]$$

$$= 0.5506 \times \exp\left(-1.8149 \times (x_j - 1.2857)^2\right)$$

Computing the conditional probability for "House"

$$\mu = \frac{1}{7}(1+1+1+1+1+1+1.5)$$

$$= 1.0714$$

$$\sigma^2 = 0.0306 \quad , \quad \sigma = 0.1749$$

$$P(x = \text{Bathroom} \mid c = \text{House}) = \frac{1}{\sqrt{2\pi \times 0.1749}} \times \exp\left[-\frac{(x_j - 1.0714)^2}{2 \times 0.0306}\right]$$

$$= 0.9539 \times \exp\left(-16.337 \times (x_j - 1.0714)^2\right)$$

Computing the conditional probability for "condo"

$$\mu = \frac{1}{6}(1+1+1+2.5+1+1.5)$$

$$= 1.2857$$

$$\sigma^2 = 0.2755, \quad \sigma = 0.5249$$

$$P(x = \text{Bathroom} \mid c = \text{condo}) = 0.5506 \times \exp\left(-1.8149 \times (x_j - 1.2857)^2\right)$$

3. Land area

a) Apartment:

$\mu = 6.103$

$\sigma^2 = 10.6178$, $\sigma = 3.2585$

$p(x = \text{Land Area} \mid c = \text{Apartment}) = 0.2209 \times \exp(-0.047 \times (x_j - 6.103)^2)$

b) House:

$\mu = 6.6309$

$\sigma^2 = 5.0578$, $\sigma = 2.248$

$p(x \mid c) = 0.266 \times \exp(-0.098 \times (x_j - 6.6309)^2)$

c) Condo:

$\mu = 6.0247$

$\sigma^2 = 6.4758$, $\sigma = 2.5448$

$p(x \mid c) = 0.25 \times \exp(-0.077 \times (x_j - 6.0247)^2)$

4. Living area

a) Apartment

$\mu = 1.505$

$\sigma^2 = 0.4958$, $\sigma = 0.704$

$p(x \mid c) = 0.4754 \times \exp(-1.008 \times (x_j - 1.505)^2)$

b). House:

$\mu = 1.3917$, $\sigma^2 = 0.0453$, $\sigma = 0.2128$

$p(x \mid c) = 0.8648 \times \exp(-11.038 \times (x_j - 1.3917)^2)$

c) Condo:

$\mu = 1.5533$, $\sigma^2 = 0.8527$, $\sigma = 0.9234$

$p(x \mid c) = 0.415 \times \exp(-0.5864 \times (x_j - 1.5533)^2)$

5 # Garage

a) Apartment:

$\mu = 1.2142$, $\sigma^2 = 0.4881$, $\sigma = 0.6986$

$p(x|c) = 0.4773 \times \exp(-1.024 \times (x_j - 1.2142)^2)$

b) House:

$\mu = 1.0714$, $\sigma^2 = 0.7023$, $\sigma = 0.838$

$p(x|c) = 0.4358 \times \exp(-0.7119 \times (x_j - 1.0714)^2)$

c) Condo:

$\mu = 1.33$, $\sigma^2 = 0.267$, $\sigma = 0.5164$

$p(x|c) = 0.555 \times \exp(-1.8747 \times (x_j - 1.33)^2)$

6) # Rooms

a) Apartment:

$\mu = 6.8571$, $\sigma^2 = 1.8095$, $\sigma = 1.3452$

$p(x|c) = 0.3439 \times \exp(-0.3717 \times (x_j - 6.8571)^2)$

b) House:

$\mu = 6.1429$, $\sigma^2 = 0.4762$, $\sigma = 0.6901$

$p(x|c) = 0.5781 \times \exp(-0.7246 \times (x_j - 6.1429)^2)$

c) Condo:

$\mu = 6.833$, $\sigma^2 = 2.567$, $\sigma = 1.6021$

$p(x|c) = 0.2485 \times \exp(-0.3121 \times (x_j - 6.833)^2)$

7. # Bedrooms

a) Apartment

$\mu = 3.4287$, $\sigma^2 = 0.9524$, $\sigma = 0.9759$

$p(x|c) = 0.4088 \times \exp(-0.5123 \times (x_j - 3.4287)^2)$

b) House :

$\mu = 3, \quad \sigma^2 = 0.333, \quad \sigma = 0.5774$

$p(x|c) = 0.6909 \times \exp(-0.866 \times (x_j - 3)^2)$

c) Condo :

$\mu = 3.333, \quad \sigma^2 = 0.667, \quad \sigma = 0.8165$

$p(x|c) = 0.4886 \times \exp(-0.6124 \times (x_j - 3.333)^2)$

3. Age of home

a) Apartment :

$\mu = 38.714, \quad \sigma^2 = 215.5714, \quad \sigma = 14.682$

$p(x|c) = 0.0272 \times \exp(-0.034 \times (x_j - 38.714)^2)$

b) House :

$\mu = 34.2857, \quad \sigma^2 = 161.9048, \quad \sigma = 12.7242$

$p(x|c) = 0.0313 \times \exp(-0.0393 \times (x_j - 34.2857)^2)$

c) Condo :

$\mu = 39.667, \quad \sigma^2 = 194.667, \quad \sigma = 13.9523$

$p(x|c) = 0.0286 \times \exp(-0.0358 \times (x_j - 39.667)^2)$