1.

x	4	5	6	7
P(x=x)	0.2	0.4	0.3	0.1

a. $\mu = 4\cdot 0.2 + 5\cdot 0.4 + 6\cdot 0.3 + 7\cdot 0.1 = 5.3$

$\sigma^2 = (4-5.3)^2\cdot .2 + (5-5.3)^2\cdot 0.4 + (6-5.3)^2\cdot 0.3 + (7-5.3)^2\cdot 0.1 = 0.81$

b. $\mu_{\hat{x}} = \mu =$

$\sigma^2_{\hat{x}} = \frac{\sigma^2}{36} = 0.0225$

c. ~~[illegible]~~

$\sigma_{\hat{x}} = \frac{\sqrt{\sigma^2}}{\sqrt{36}} = 0.15$ std. dev. for sample

$P(\hat{x} > 5.5)$ $P\left(Z < \frac{5.5-5.3}{0.15}\right)$ $\quad Z = \frac{\hat{x} - \mu_{\hat{x}}}{\sigma_{\hat{x}}}$ is normal dist

$\approx P(Z < 1.3\overline{3})$ std normal distribution

$= \int_{-\infty}^{1.3\overline{3}} \varphi(x)\,dx \approx 0.909$

2. $f(x) = \frac{1}{1}\cdot \phi\left(\frac{x-7}{1}\right) = \phi(x-7)$

$\sigma_{\hat{x}} = \frac{\sqrt{0.2}}{\sqrt{9}} = \frac{1}{3}$

a. $P(6.4 \le \hat{x} \le 7.2) = P\left(\frac{6.4-7}{1/3} < Z < \frac{7.2-7}{1/3}\right) = P(-5.4 < Z < 1.8)$

$= \int_{-1.8}^{0.6} \phi(x)\,dx \approx 0.668$

b. $\int_{\alpha}^{\infty} \phi(x)\,dx = 15 \Rightarrow \alpha = 1.036$

$1.036 = \frac{x-7}{1/3} \Rightarrow x = 10.108$

3. $\mu = 3.2 \quad \sigma = 1.4 \quad n = 64$

$\sigma_{\hat{x}} = \frac{1.4}{\sqrt{64}} = 0.2$; $\quad z$ - std. dev.

a. $P(\hat{x} \le 2.7) = P\left(Z \le \frac{2.7-3.2}{0.2}\right) = P(Z \le -2.5) \Rightarrow \int_{-\infty}^{-2.5} \phi(x)\,dx \approx 0.994$

b. $P(\hat{x} > 3.5) = P\left(Z > \frac{3.5-3.2}{0.2}\right) = P(Z > 1.5) \Rightarrow \int_{1.5}^{\infty} \phi(x)\,dx \approx 0.0668$

c. $P(3.2 \le \hat{x} < 3.4) = \left(0 \le Z \le \frac{3.4-3.2}{0.2}\right) = \int_0^1 \phi(x)\,dx = 0.341$

4. weight $\sigma^2 = 1$ oz. $n = 34$ $\hat{x}_A = 4.5$ oz. $\hat{x}_B = 4.7$

a. $P(x_B - x_A \geq 0.2)$

$\mu_{\hat{x}_A - \hat{x}_B} = \mu_A - \mu_B = 0$

$= P\left(Z \geq \frac{0.2 - 0}{0.2357}\right)$

$\sigma_{\hat{x}_A - \hat{x}_B} = \sqrt{\frac{\sigma_A^2}{n_A} + \frac{\sigma_B^2}{n_B}} = \sqrt{\frac{1}{34} + \frac{1}{34}} \approx 0.2357$

$= \int_{0.849}^{\infty} \phi(x)\,dx = 0.198$

6. ~~suggests that given the suggested~~ with the given sample size and distribution and variance there is a 19.8% chance of getting the values of greater or equal difference to the ones observed which seems to be a reasonably high chance giving no support for the conjecture

5.