

# MATH 392 Problem Set 3

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*7 February 2018*

4.8

$$n = 20, \mu = 6, \sigma^2 = 10$$

$$P(\bar{X} \leq 4.6) = P\left(\frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \leq \frac{4.6 - \mu}{\sigma/\sqrt{n}}\right)$$

$$P(\bar{X} \leq 4.6) = P\left(\frac{\bar{X} - 6}{\sqrt{10}/\sqrt{20}} \leq \frac{4.6 - 6}{\sqrt{10}/\sqrt{20}}\right)$$

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# Calculate Z score of interested statistic  
(4.6-6)/(sqrt(10)/sqrt(20))
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## [1] -1.979899
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$$P(\bar{X} \leq 4.6) = P(Z \leq -1.98)$$

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# Calculate probability using the cdf of N(0,1)  
pnorm(-1.98, 0, 1)
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## [1] 0.02385176
```

$$P(\bar{X} \leq 4.6) = .02385$$

4.9

$$f_X(x) = \frac{3}{16}(x-4)^2 \text{ for } 2 \leq x \leq 6$$

Find  $E[X]$ :

$$E[X] = \int_2^6 x \frac{3}{16}(x-4)^2 dx$$

$$E[X] = \int_2^6 \frac{3}{16}x(x^2 - 8x + 16) dx$$

$$E[X] = \int_2^6 \frac{3}{16}x^3 - \frac{3}{2}x^2 + 3x dx$$

$$E[X] = \frac{3}{64}x^4 - \frac{1}{2}x^3 + \frac{3}{2}x^2 \Big|_2^6$$

$$E[X] = 4$$

Find  $V[X]$ :

**4.12**

**4.13**

**4.18**

**4.20**

**4.21**