Probability and Statistics – Quiz 2(Solution)

1.

$n = 8$ and $p = 0.60$;

$P(X = 6) = \binom{8}{6}(0.6)^6(0.4)^2 = 0.2090.$

2.

(a)

Using the Poisson distribution with $x = 5$ and $\mu = 3$, we find from Table A.2 that

$$p(5; 3) = \sum_{x=0}^{5} p(x; 3) - \sum_{x=0}^{4} p(x; 3) = 0.1008.$$

(b)

$P(X < 3) = P(X \leq 2) = 0.4232.$

3.

(a)

i. The mode, which is the point on the horizontal axis where the curve is a maximum, occurs at x = μ.

ii. The curve is symmetric about a vertical axis through the mean μ.

iii. The curve has its points of inflection at $x = \mu \pm \sigma$ is concave downward if $\mu - \sigma < x < \mu + \sigma$, and is concave upward otherwise.

iv. The normal curve approached the horizontal axis asymptotically as we proceed in either direction away from the mean.

v. The total area under the curve and above the horizontal axis is equal to 1.

(b)

$z_1 = (171.25 - 174.5)/6.9 = -0.47$, $z_2 = (182.25 - 174.5)/6.9 = 1.12$.
$P(171.25 < X < 182.25) = P(-0.47 < Z < 1.12) = 0.8686 - 0.3192 = 0.5494.$
Therefore, $(1000)(0.5494) = 549$ students.

4.

$\mu = np = (100)(0.1) = 10$ and $\sigma = \sqrt{(100)(0.1)(0.9)} = 3.$

$z = (13.5 - 10)/3 = 1.17$; $P(X > 13.5) = P(Z > 1.17) = 0.1210.$