1: F, F, T, F, T, F, T, F, T, T, F, T, T, F

2-6: A; ACD; BFG; C; C

7:

a) 645/1654=0.39

b) $(922/1654)^2=0.5574^2=0.31$

c) $\binom{5}{2} \times 0.4426^2 \times 0.5574^3 = 0.34$

d) n=100, p=0.5574, np>5 and n(1-p)>5, so we can use normal approximation.

$$P(X \geq 60) \approx P(X \geq 59.5) = P\left(Z \geq \frac{59.5 - 55.74}{\sqrt{100 \times 0.5574 \times 0.4426}}\right) = P(Z \geq 0.76)$$

$$= 0.2236$$

8:

a) Let μ be the mean SSHA score for the older students. H_0: μ=115 vs. H_a: μ>115

b) Rejection region: $\{Z \geq Z_\alpha\} = \{Z \geq Z_{0.05}\} = \{Z \geq 1.645\}$

c) $Z = \frac{122.2-115}{30/\sqrt{50}} = 1.70$; p-value is P(Z≥1.70)=0.0446.

d) Reject the null hypothesis and conclude that μ is significantly greater than 115.

e) 95% CI: $122.2 \pm 1.96 \times \frac{30}{\sqrt{50}} = 122.2 \pm 8.3 = [113.9, 130.5]$

f) No, we don't need normality assumption. Central Limit Theorem applies when n≥30.

g) $\left(\frac{2\times z_{0.05/2}\times 30}{10}\right)^2 \leq n \Leftrightarrow \left(\frac{2\times 1.96\times 30}{10}\right)^2 \leq n \Leftrightarrow 138.3 \leq n$. The minimum sample size is 139.