HW (SIGN TEST)

1. Cholesterol levels in children has pop. median Q_2.
R.S. 12 children found
154 139 194 145 133 172 135 149 142 150 184 155

a) Test $H_0: Q_2 = 180$
$H_A: Q_2 < 180$
$\alpha = 0.05$
1) $x^* = n_- = 10$
2) p-value $= P(X \geq x^*)$ $\quad X \sim Bin(n=12, p=\frac{1}{2}) \rightsquigarrow \binom{n}{x} p^x (1-p)^{n-x}$
$= P(X \geq 10)$
$= P(X=10) + P(X=11) + P(X=12)$
$= \binom{12}{10} 0.5^{10} (1-0.5)^{12-10} + \dots$
$= 0.019$
3) Rej H_0. Ev. $Q_2 < 180$

b) Test $H_0: Q_2 = 140$
$H_A: Q_2 > 140$
$\alpha = 0.05$
1) $x^* = n_+ = 9$
2) p-value $= P(X \geq x^*)$ $\quad X \sim Bin(n=12, p=\frac{1}{2})$
$= P(X \geq 9)$
$= 0.073$
3) Do not Rej H_0.
No ev. $Q_2 > 140$.

c) Test $H_0: Q_2 = 160$

$H_{a1}: Q_2 \neq 160$

$\alpha = 0.05$

1) $X^* = \text{Max}(n-, n+)$

$= \text{Max}(9, 3)$

$= 9$

2) p-value $= 2P(X \geq x^*)$ $\quad X \sim \text{Bin}(n=12, p=\frac{1}{2})$

$= 2P(X \geq 9)$

$= 2(0.073)$

$= 0.146$

3) Do not Rej. H_0.

No ev. $Q_2 \neq 160$