

$$9. (a) X'Y' + WX'Z + WX'$$

$$= X'Y'(Z+Z')(W+W') + WX'Z(Y+Y') + WX'(Y+Y')(Z+Z')$$

$$= X'Y'ZW + X'Y'ZW' + X'Y'Z'W + X'Y'Z'W'$$

$$+ X'Y'ZW + \cancel{X'Y'ZW}$$

$$+ \cancel{X'Y'ZW} + X'Y'Z'W + \cancel{X'Y'Z'W} + \cancel{X'Y'Z'W}$$

$$= X'Y'ZW + X'Y'ZW' + X'Y'Z'W + X'Y'Z'W' + X'Y'ZW + X'Y'Z'W$$

$$(b) (X+Y)WZ + (X+Y)'$$

$$= XWZ + YWZ + X'Y'$$

$$= XWZ(Y+Y') + YWZ(X+X') + X'Y'(Z+Z')(W+W')$$

$$= XYWZ + X'Y'WZ + \cancel{XYWZ} + X'Y'WZ$$

$$+ X'Y'ZW + X'Y'ZW' + X'Y'Z'W + X'Y'Z'W'$$

$$= XYWZ + X'Y'WZ + X'Y'WZ + X'Y'ZW + X'Y'ZW' + X'Y'Z'W + X'Y'Z'W'$$