3-3

題號: 3, 5, 9, 20

Please check the answers attached at the textbook for problem #3, #5, #9

3-3 #20
a. Show that the cubic polynomials

$$P(x) = 3-2(x + 1) + 0(x + 1)(x) + (x + 1)(x)(x-1)$$

and

$$Q(x) = -1 + 4(x + 2)-3(x + 2)(x + 1) + (x + 2)(x + 1)(x)$$

both interpolate the following data.

x	-2	-1	0	1	2
$f(x)$	-1	3	1	-1	3

b. Why does part (a) not violate the uniqueness property of interpolating polynomials?

Answer:
(a) $P(-2) = Q(-2) = -1$, $P(1) = Q(1) = 3, P(0) = Q(0) = 1, P(1) = Q(1) = -1$, $P(2) = Q(2) = 3$

(b) The format of the polynomial is not unique. If $P(x)$ and $Q(x)$ are expanded, they are identical. There is only one interpolating polynomial if the degree is less than or equal to four for the given data. However, it can be expressed in various ways depending on the application.