7. Use the polynomial $f(x)= x^3 + 9x^2 + 6x - 56$ to determine if the following are factors.

a. $x - 4 = 0$
$x = 4$
$f(4) = 4^3 + 9(4)^2 + 6(4) - 56 = 64 + 144 + 24 - 56 = 176$
not a factor

b. $x - 2 = 0$
$x = 2$
$f(2) = 2^3 + 9(2)^2 + 6(2) - 56 = 8 + 36 + 12 - 56 = 0$
$x - 2$ is a factor

$$\begin{array}{r} 8 \\ 49 \\ 9 \\ \hline 441 \end{array}$$

c. $x + 7 = 0$
$x = -7$
$f(-7) = (-7)^3 + 9(-7)^2 + 6(-7) - 56 = -343 + 441 - 42 - 56 = 0$
$x + 7$ is a factor

d. $x + 2 = 0$
$x = -2$
$f(-2) = (-2)^3 + 9(-2)^2 + 6(-2) - 56 = -8 + 36 - 12 - 56 = -40$
$x + 2$ is not a factor

8. . Use the polynomial $f(x)= x^3 + 6x^2 + x + 6$ to determine if the following are factors:

a. $x + 6 = 0$
$x = -6$
$f(-6) = (-6)^3 + 6(-6)^2 + 6 + 6 = -216 + 216 - 6 + 6 = 0$
$x + 6$ is a factor

b. $x - 1 = 0$
$x = 1$
$f(1) = 1^3 + 6(1)^2 + 1 + 6 = 1 + 6 + 1 + 6 = 14$
$x - 1$ is not a factor

c. $x + 1 = 0$
$x = -1$
$f(-1) = (-1)^3 + 6(-1)^2 + -1 + 6 = -1 + 6 - 1 + 6 = 10$
$x + 1$ is not a factor