(1) let $p(z) = az^3 + 4z^2 + 3z - 4$

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$q(z) = z^3 - 4z + a$

when $p(z)$ and $q(z)$ are divided by $z-3$ they leave equal remainder

$p(3) = q(3)$ by remainder theorem

$a \times 3^3 + 4 \times 3^2 + 3 \times 3 - 4 = 3^3 - 4 \times 3 + a$

$\Rightarrow 27a + 36 + 9 - 4 = 27 - 12 + a$

$\Rightarrow 27a + 41 = 15 + a$

$\Rightarrow 26a = -26$

$\Rightarrow a = -1$

(2) $p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$

when $p(x)$ is divided by $x+1$ remainder is 19

$\therefore p(-1) = 19$ by remainder theorem

$(-1)^4 - 2(-1)^3 + 3(-1)^2 - a(-1) + 3a - 7 = 19$

$\Rightarrow 1 + 2 + 3 + a + 3a - 7 = 19$

$\Rightarrow 4a - 1 = 19$

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$\Rightarrow 4a = 20$

$\Rightarrow a = 5$

$\therefore p(x) = x^4 - 2x^3 + 3x^2 - 5x + 8$

when $p(x)$ is divided by $x+2$ remainder by remainder theorem $= p(-2)$

$= (-2)^4 - 2(-2)^3 + 3(-2)^2 - 5(-2) + 8$

$= 16 + 16 + 12 + 10 + 8$

$= 62$