Polynomials

Solutions Main Menu

89 When $g(x)$ is divided by x^2+x-6 the remainder is $7x+13$.
What is the remainder when $g(x)$ is divided by $x+3$?

(A) -8
(B) -5
(C) 34
(D) 55

90 Consider the polynomial $P(x)=3x^3+3x+a$.
If $x-2$ is a factor of $P(x)$, what is the value of a?

(A) -30
(B) -18
(C) 18
(D) 30

91 Consider the polynomial $P(x)=2x^3+x^2+2x+a$.
If $x-1$ is a factor of $P(x)$, what is the value of a?

(A) -6
(B) -5
(C) 5
(D) 6

92 The polynomial $P(x)=x^4-kx^3-2x+33$ has $(x-3)$ as a factor.
What is the value of k?

(A) -5
(B) -4
(C) 4
(D) 5

93 It is known that two of the roots of the equation $3x^3+x^2-kx+6=0$ are reciprocals of each other. What is the value of k?

(A) -2
(B) 6
(C) 7
(D) 17

94 The polynomial $f(x)=2x^2+kx+4$ can be expressed as $f(x)=(x-2)g(x)+6$.
Which of the following is the correct expression for $g(x)$?

(A) $2x-1$
(B) $2x+1$
(C) $2x-3$
(D) $2x+3$

95 If α, β and γ are the roots of $x^3-4x+1=0$ what is the value of $\alpha\beta\chi$?

(A) -4
(B) -1
(C) 1
(D) 4

96 If α, β and γ are the roots of $x^3-4x^2+2x-6=0$ what is the value of $\alpha+\beta+\chi$?

(A) -6
(B) -4
(C) 4
(D) 6

97 If α, β and γ are the roots of $x^3-2x^2+3x-1=0$ what is the value of $\alpha\beta+\beta\gamma+\chi\alpha$?

(A) -3
(B) -2
(C) 2
(D) 3

98 Let α, β and γ be the roots of $3x^3+8x^2-1=0$.
What is the value of $(\alpha+\frac{1}{\beta})(\beta+\frac{1}{\gamma})(\gamma+\frac{1}{\alpha})$?

(A) $-\frac{8}{3}$
(B) $-\frac{1}{3}$
(C) $\frac{1}{3}$
(D) $\frac{2}{3}$

99 Let α, β and γ be the roots of $2x^3+x^2-4x+9=0$.

What is the value of $\frac{1}{\alpha\beta}+\frac{1}{\alpha\gamma}+\frac{1}{\beta\gamma}$?

(A) $-\frac{1}{2}$

(B) $-\frac{1}{9}$

(C) $\frac{1}{9}$

(D) $\frac{1}{2}$

100 Let α, β and γ be the roots of $x^3-4x+1=0$.

What is the value of $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$?

(A) -4

(B) -1

(C) 1

(D) 4

101 Let α, β and γ be the roots of $4x^3-2x^2+3x-2=0$.

What is the value of $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$?

(A) $-\frac{3}{2}$

(B) $-\frac{2}{3}$

(C) $\frac{2}{3}$

(D) $\frac{3}{2}$

102 Let α, β and γ be the roots of $x^3-3x+2=0$.

What is the value of $\alpha^2+\beta^2+\gamma^2$?

(A) -3

(B) 0

(C) 6

(D) 8

Polynomials		Main Menu
	Solution	**Criteria**
89	$g(x)=(x^2+x-6)Q(x)+(7x+13)$ $=(x+3)(x-2)Q(x)+(7x+13)$ Remainder when $g(x)$ is divided by $(x+3)$ is $g(-3)$ $g(-3)=7\times-3+13=-8$	1 Mark: A
90	$P(x)=3x^3+3x+a$ $P(2)=3(2)^3+3(2)+a=0$ ($x-2$ is a factor of $P(x)$) $24+6+a=0$ $a=-30$	1 Mark: A
91	$P(x)=2x^3+x^2+2x+a$ $P(1)=2\times1^3+1^2+2\times1+a=0$ ($x-1$ is a factor of $P(x)$) $2+1+2+a=0$ $a=-5$	1 Mark: B
92	$P(x)=x^4-kx^3-2x+33$ $P(3)=3^4-k\times3^3-2\times3+33=0$ ($x-3$ is a factor of $P(x)$) $81-27k-6+33=0$ $108-27k=0$ $k=4$	1 Mark: C
93	Let the roots be $\alpha,\frac{1}{\alpha}$ and β. $3x^3+x^2-kx+6=0$ $\alpha\beta\gamma=-\frac{d}{a}$ $\alpha\times\frac{1}{\alpha}\times\beta=-\frac{6}{3}$ $\beta=-2$ Substitute $\beta=-2$ into the equation $3(-2)^3+(-2)^2-k(-2)+6=0$ $-24+4+2k+6=0$ $2k=14$ $k=7$	1 Mark: C

94	$f(x)=(x-2)g(x)+6$ then $f(2)=6$ $f(2)=2\times2^2+k\times2+4=6$ $12+2k=6$ $2k=-6$ $k=-3$ $2x^2-3x+4=(x-2)g(x)+6$ $2x^2-3x-2=(x-2)g(x)$ $(x-2)(2x+1)=(x-2)g(x)$ $g(x)=(2x+1)$	1 Mark: B
95	$\alpha\beta\gamma=-\frac{d}{a}=-\frac{1}{1}=-1$	1 Mark: B
96	$\alpha+\beta+\gamma=-\frac{b}{a}=4$	1 Mark: C
97	$\alpha\beta+\alpha\gamma+\beta\gamma=\frac{c}{a}=\frac{3}{1}=3$	1 Mark: D
98	$\alpha+\beta+\gamma=-\frac{b}{a}=-\frac{8}{3}$ $\quad\alpha\beta\gamma=-\frac{d}{a}=-\frac{-1}{3}=\frac{1}{3}$ $\alpha\beta+\alpha\gamma+\beta\gamma=\frac{c}{a}=0$ $(\alpha+\frac{1}{\beta})(\beta+\frac{1}{\gamma})(\gamma+\frac{1}{\alpha})=(\alpha\beta+\frac{\alpha}{\gamma}+1+\frac{1}{b\gamma})(\gamma+\frac{1}{\alpha})$ $=\alpha\beta\gamma+\beta+\alpha+\frac{1}{\gamma}+\gamma+\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\alpha b\gamma}$ $=\frac{1}{3}-\frac{8}{3}+3+\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$ $=\frac{1}{3}-\frac{8}{3}+3+\frac{\alpha\beta+\beta\gamma+\alpha\lambda}{\alpha\beta\gamma}$ $=\frac{2}{3}$	1 Mark: D
99	$\alpha+\beta+\gamma=-\frac{b}{a}=-\frac{1}{2}$ $\quad\alpha\beta\gamma=-\frac{d}{a}=-\frac{9}{2}$ $\frac{1}{\alpha\beta}+\frac{1}{\alpha\gamma}+\frac{1}{\beta\gamma}=\frac{\alpha+\beta+\gamma}{\alpha\beta\gamma}=\frac{-\frac{1}{2}}{-\frac{9}{2}}=\frac{1}{9}$	1 Mark: C

100	$\alpha\beta+\alpha\gamma+\beta\gamma=\frac{c}{a}=\frac{-4}{1}=-4$ $\alpha\beta\gamma=-\frac{d}{a}=-\frac{1}{1}=-1$ $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=\frac{\alpha\beta+\alpha\gamma+\beta\gamma}{\alpha\beta\gamma}$ $=\frac{-4}{-1}=4$	1 Mark: D
101	$\alpha\beta+\alpha\gamma+\beta\gamma=\frac{c}{a}=\frac{3}{4}$ $\alpha\beta\gamma=-\frac{d}{a}=-\frac{-2}{4}=\frac{1}{2}$ $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=\frac{\alpha\beta+\alpha\gamma+\beta\gamma}{\alpha\beta\gamma}$ $=\frac{\frac{3}{4}}{\frac{1}{2}}=\frac{3}{2}$	1 Mark: D
102	$\alpha+\beta+\gamma=-\frac{b}{a}=-\frac{0}{1}=0$ $\alpha\beta+\alpha\gamma+\beta\gamma=\frac{c}{a}=\frac{-3}{1}=-3$ $(\alpha+\beta+\gamma)^2=\alpha^2+\beta^2+\gamma^2+2(\alpha\beta+\alpha\gamma+\beta\gamma)$ $0=\alpha^2+\beta^2+\gamma^2+2\times-3$ $\alpha^2+\beta^2+\gamma^2=6$	1 Mark: C