Algebra 3 Assignment # 14

(1) Express each of the following as a single fraction in simplified form please.

(a) $\dfrac{6x - 6}{3 - 3x}$

(b) $\dfrac{x^5 - 2x^4 + 3x^3 - 6x^2}{x^4 - 8x}$

(2) Perform the indicated operations. Express each answer as a single fraction in simplified form.

(a) $\dfrac{1}{6x} + \dfrac{1}{3y} - \dfrac{3x + 2y}{12xy}$

(b) $\dfrac{x^2 + 4x - 1}{2x - 3} - \dfrac{8 + x - x^2}{2x - 3}$

(c) $\dfrac{5x + 1}{x^2 - 2x - 3} - \dfrac{1}{x + 1} - \dfrac{3}{3 - x}$

(d) $\dfrac{x}{x - 3} + \dfrac{x^2 + 9}{9 - x^2} + \dfrac{3}{x + 3}$

(e) $\dfrac{\left(2x^3\right)^2}{3y^4} \cdot \dfrac{\left(-y^3\right)^2}{8x^4}$

(f) $\dfrac{9 - x^2}{4x^3 + 3x^2 + 4x + 3} \div \dfrac{x^3 + 27}{24x^2 - 2x - 15} \div \dfrac{6x^2 - 23x + 15}{x^3 - 3x^2 + 9x}$

(g) $\left(\dfrac{x + 4}{2x - 4} - \dfrac{2x + 5}{x^2 - x - 2} + \dfrac{3}{4}\right) \div \left(\dfrac{5x + 9}{x + 1}\right)$

(h) $\left(x - \dfrac{2}{x + 1}\right) \bullet \left(1 - \dfrac{1}{x + 2}\right)$

(i) $\dfrac{x - 4}{2x^2 + 3x - 2} + \dfrac{6}{x^2 - x - 6}$

(j) $\dfrac{\left(\dfrac{x + 1}{x - 1} - \dfrac{2}{x + 1}\right)}{\left(\dfrac{x - 1}{x + 1} + \dfrac{2x}{x - 1}\right)}$

(k) $\dfrac{\left(x + 2 - \dfrac{12}{x + 3}\right)}{\left(x - 5 + \dfrac{16}{x + 3}\right)}$

(3) Divide. Express each answer as a polynomial or a mixed expression please.

(a) $\dfrac{x^2 + 4x + 8}{x + 3}$

(b) $\dfrac{x^3 - 4x^2 + x + 6}{x - 2}$

(4) Factor the polynomial $12x^4 + 59x^3 - 97x^2 - 94x + 120$ if $x^2 + 5x - 6$ is a factor.

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Answers

(1) **(a)** -2 **(b)** $\dfrac{x\left(x^2+3\right)}{x^2+2x+4}$

(2) **(a)** $\dfrac{1}{12y}$ **(g)** $\dfrac{1}{4}$

(b) $x+3$ **(h)** $x-1$

(c) $\dfrac{7}{x-3}$ **(i)** $\dfrac{(x+3)}{(2x-1)(x-3)}$

(d) $\dfrac{6}{x+3}$ **(j)** $\dfrac{x^2+3}{3x^2+1}$

(e) $\dfrac{x^2y^2}{6}$ **(k)** $\dfrac{x+6}{x-1}$

(f) $-\dfrac{x}{x^2+1}$

(3) **(a)** $x+1+\dfrac{5}{x+3}$ **(b)** x^2-2x-3

(4) $(x-1)(x+6)(4x+5)(3x-4)$

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(5) Simplify each of the following please.

(a) $\sqrt{-81}$

(b) $\left(\sqrt{-15}\right)\left(-\sqrt{10}\right)$

(c) $\left(-3\sqrt{5}\right)\left(3\sqrt{-5}\right)$

(d) $\left(-\sqrt{-9}\right)\left(\sqrt{-25}\right)$

(e) $\left(4\sqrt{-12}\right)\left(-2\sqrt{-3}\right)$

(f) $\sqrt{-\frac{14}{21}}$

(g) $(4i)^2 - 16$

(h) $(-i)^3\left(i^2\right)^3$

(i) i^{123}

(j) i^{-57}

(k) $i^2 + i^4$

(l) $i^3 + i^5 + i^7$

(m) $4i^{-3} - 3i^{-13}$

(n) $(3 + 4i) + (5 - 2i)$

(o) $(3 + 4i) - (5 - 2i)$

(p) $(3 + 4i)(5 - 2i)$

(q) $(2+7i)-(3+4i)+(7-6i)$

(r) $(4 + 3i)^2$

(s) $\left(2-\sqrt{5}\,i\right)^2 - 4\left(2-\sqrt{5}\,i\right)+9$

(t) $(2+3i)^3$

(u) $(1+i)^{-3}$

(v) $\frac{4 + 3i}{5 - 2i}$

(w) $\frac{\sqrt{6} - \sqrt{-2}}{\sqrt{6} + \sqrt{-2}}$

(x) $\frac{4 + i}{3 - i} - \frac{-1 + 2i}{1 + 3i}$

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Answers

(a) $9i$

(b) $-5\sqrt{6}\,i$

(c) $-45i$

(d) 15

(e) 48

(f) $\frac{\sqrt{6}\,i}{3}$

(g) -32

(h) $-i$

(i) $-i$

(j) $-i$

(k) 0

(l) $-i$

(m) $7i$

(n) $8 + 2i$

(o) $-2 + 6i$

(p) $23 + 14i$

(q) $6 - 3i$

(r) $7 + 24i$

(s) 0

(t) $-46 + 9i$

(u) $\frac{-1 - i}{4}$

(v) $\frac{14 + 23i}{29}$

(w) $\frac{1 - \sqrt{3}\,i}{2}$

(x) $\frac{3 + i}{5}$