

MATH 103 EXAM #2 KEY (FALL 2013)

$$\mathbf{1} \quad (q^4 - 2q^2 + 10) + (3q^4 + 5q^2 - 5) = 4q^4 + 3q^2 + 5.$$

$$\mathbf{2} \quad (4w^2 + 6w - 7) - (-3w^2 + 5w - 9) = 4w^2 + 6w - 7 + 3w^2 - 5w + 9 = 7w^2 + w + 2.$$

3a $5u^3z^4(-4u^2z^5) = -20u^5z^9.$

3b $2\beta^5(\beta - 8)(\beta + 3) = 2\beta^5(\beta^2 - 5\beta - 24) = 2\beta^7 - 10\beta^6 - 48\beta^5.$

3c $(t-4)^3 = (t-4)(t-4)(t-4) = (t-4)(t^2-8t+16) = t^3-12t^2+48t-64.$

4a Apply long division to obtain $\frac{x^3 + 3x^2 - 4}{x + 3} = x^2 - \frac{4}{x + 3}$.

4b Apply long division to obtain $\frac{8v^4 + 6v^3 + 12v - 32}{4v^2 + 3v - 8} = 2v^2 + 4$, as shown below:

[illegible]

5a $10r^5 - 2r^3 - 4r^4 = 2r^3(5r^2 - 1 - 2r).$

5b $2(5-x)^3 - 3(5-x)^2 = (5-x)^2[2(5-x) - 3] = (5-x)^2(10-2x-3) = (5-x)^2(7-2x).$

6 $4 + st - 2t - 2s = (-2t + 4) + (st - 2s) = -2(t - 2) + s(t - 2) = (t - 2)(-2 + s) = (t - 2)(s - 2).$

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

7b $4k^2 + 28kr + 49r^2 = (2k + 7r)(2k + 7r) = (2k + 7r)^2.$

7c $49z^2 - 16 = (7z)^2 - 4^2 = (7z - 4)(7z + 4).$

7d $250y^3 + 16q^3 = 2(125y^3 + 8q^3) = 2[(5y)^3 + (2q)^3] = 2(5y + 2q)(25y^2 - 10yq + 4q^2).$

7e $48c^4 - 243 = 3(16c^4 - 81) = 3[(4c^2)^2 - 9^2] = 3(4c^2 - 9)(4c^2 + 9) = 3(2c - 3)(2c + 3)(4c^2 + 9).$

8a We have

$$\begin{aligned} 2x^2 + x - 3 = 0 &\Rightarrow (2x + 3)(x - 1) = 0 \\ &\Rightarrow 2x + 3 = 0 \quad \text{or} \quad x - 1 = 0 \\ &\Rightarrow x = -\frac{3}{2} \quad \text{or} \quad x = 1 \\ &\Rightarrow \left\{-\frac{3}{2}, 1\right\} \text{ is the solution set.} \end{aligned}$$

8b We have

$$3z^2 - 27z = 0 \Rightarrow 3z(z - 9) = 0 \Rightarrow z = 0, 9,$$

so solution set is $\{0, 9\}$.

8c We have

$$6t^3 - 13t^2 - 5t = t(6t^2 - 13t - 5) = t(3t + 1)(2t - 5),$$

so equation becomes

$$t(3t + 1)(2t - 5) = 0.$$

Solution set: $\left\{0, -\frac{1}{3}, \frac{5}{2}\right\}$