Exercise 1: (3.25 points) Work out the value of the following expressions and simplify if possible:

a) $\dfrac{x^2-9}{x^2-1} : \dfrac{x^2-6x+9}{x^2-2x+1} = \dfrac{x^2+2x-3}{x^2-2x-3}$ (1)

b) $\dfrac{x^2-10x+25}{9x^4-45x^3} \cdot \dfrac{3x^3+15x^2}{x^2-25} = \dfrac{1}{3x}$ (1)

c) $\dfrac{x^3-2x^2-13x-10}{x^3-4x^2-5x} = \dfrac{x+2}{x}$ (1.25)

Exercise 2: (0.5 points) Find the value of k so that the polynomial $P(x)=x^4+kx^3-5x^2+6x$ is a multiple of $(x-2)$ $\boxed{k=-1}$

Exercise 3: (1.25 points) Rationalize the following expressions:

a) $\dfrac{35}{\sqrt[9]{7^6}} = 5\sqrt[9]{7^3}$

b) $\dfrac{3}{\sqrt{3}} = \sqrt{3}$

c) $\dfrac{\sqrt{7}+\sqrt{2}}{\sqrt{7}-\sqrt{2}} = \dfrac{9+2\sqrt{14}}{5}$

Exercise 4: (0.75 points) Find the percentage error when rounding $\sqrt{7}$ to the nearest thousandths

$E_p = 0.0094\%$

Exercise 5: (1 point) Study the following unions and intersections of intervals and **write them as inequalities** too:

a) $(-\infty,2]\cup[1,7)=(-\infty,7) \rightarrow x<7$

b) $(-5,-2]\cap(-3,1]=(-3,-2] \rightarrow -3<x\le-2$

Exercise 6: (1 point) Solve and factorize the equation $P(x)=x^5+x^4-34x^3-34x^2+225x+225$

Roots: $x=-1,\ x=\pm3,\ x=\pm5$

Factorization: $(x+1)(x+3)(x-3)(x+5)(x-5)$

Exercise 7: **(2.25 points)** Work out, express as a single radical and simplify if possible:

a) $\sqrt{405} - 7\sqrt{320} + 2\sqrt{125} = -37\sqrt{5}$

b) $\dfrac{\sqrt[6]{2^5 \cdot 7^{-3}}}{\sqrt[5]{7^{-4} \cdot 2^3}} = \sqrt[30]{2^7 \cdot 7^9}$

c) $\left(\sqrt[5]{x^{-4}} : \sqrt{x^5}\right) \cdot \left(\sqrt[3]{x^2} : \sqrt[7]{x^{-3}}\right) = \dfrac{1}{x^2} \cdot \sqrt[210]{\dfrac{1}{x^{43}}}$