1. [5 marks] Solve the equation:

$$4(x-[5-2x])-3=5x-9$$

2. [5 marks] Solve the inequality:

$$1<\frac{2x-7}{5}\leq 3$$

3. [5 marks] Perform the long division:

$$\frac{2x^3-x^2+x+5}{x+3}$$

4. [5 marks] Simplify:

$$\frac{x^2+x-2}{5x+1} \div \frac{x^3-x^2-6x}{5x^2-14x-3}$$

5. [15 marks] Solve for x:

(a) [5 marks] $x^2-7x+10=0$

(b) [5 marks] $3x^2+10x=8$

(c) [5 points] $\sqrt{5x+6}-x=0$

6. [6 marks] For the line with the equation $x = 5 + 3y$

(a) Find the equation of the parallel line passing through the point (3,1);

(b) Find the equation of the perpendicular line passing through the point (-2,1).

7. [5 marks] Sketch the graph of the function

$$f(x) = -x^2 + 6x - 5$$

Find the x- and y-intercepts, the vertex, and state the range.

8. (4 points) Given $f(x)=\frac{1}{\sqrt{x}}$ and $g(x)=x^2-1$, find composite functions $(f\circ g)(x)$, $(g\circ f)(x)$ and their domains.

9. [5 marks] Solve the system of linear equations:

$$\begin{cases} x+y+z=3 \\ x+2z=5 \\ 2x-y-z=0 \end{cases}$$

10. [3 marks] Sketch the graph of the function $f(x) = 2^x - 5$

11. [3 marks] Sketch the graph of the function over an interval of 2 periods $f(x) = -2\cos\left(\frac{x}{3}\right)$

12. [12 marks] Solve for x:

(a) $\log[\log x] = 0$

(b) $\left(\frac{1}{3}\right)^{x-1} = 27$

(c) $\log_4(x-1) + \log_4(x+2) = 1$

(d) $5^{x^2} = 8^x$

13. (a) [3 marks] If $\cos\theta = \frac{1}{5}$ and $\sin\theta < 0$ find the exact value of $\tan\theta$;

(b) [3 marks] verify the identity: $\cot^2 x\left(1+\tan^2 x\right)\sin^2 x = 1$;

(c) [3marks] Solve for x on the interval $0 \le x \le 2\pi$: $\cos^2 x - \sin^2 x = \frac{1}{2}$;

(d) [3 marks] Use the reference angle to find the exact value of $\sin(870^\circ)$

14. Perform the operations and write the answer in the form $a+ib$:

(a) [4 marks] $(5+i)(3-2i)$

(b) [4 marks] $\dfrac{i}{4+3i}$

(c) [4 marks] $(\sqrt{2}+i\sqrt{2})^7$ hint: Use the polar form of the complex number.

15. [3 marks] Given that the equation $x^3-x^2+4x-4=0$ has the real solution x=1, find the two other imaginary solutions.