#26

(a) $f(x) = \dfrac{(x+2)(x-4)(2x-7)}{(x-3)(x+9)(x-7)}$

Note that $f(x) = 0$ only if $(x+2)(x-4)(2x-7)=0$

Let's solve the equation :

$x+2=0$ or $x-4=0$ or $2x-7=0$

$x=-2$ $\quad x=4$ $\quad x=\frac{7}{2}$

Answer: zeros of $f(x)$ are $-2, \frac{7}{2}, 4$

(b) $g(x) = 6x^2 - 11x - 35$

let's solve $6x^2 - 11x - 35 = 0$

3 methods: trial : $(2x \overset{a}{?})(3x \overset{b}{?})$ $= (2x-7)(3x+$

guess the constants, note that $3a + 2b = -11$
$a \cdot b = -35$

with some work you will find that $a = 7$ and $b = 5$

ac-method : $\underset{a}{6}x^2 \underset{b}{\boxed{-11}}x \underset{c}{-35}=0$

$ac = 6 \cdot (-35) = -210$

Then, find two factors of -210 that add up to $b=-11$..

They are $-21, 10$

Then, split the middle term $-11x$ into two: $-21x+10x$

$6x^2 - 21x + 10x - 35 = 0$

Then use grouping method : $\underbrace{6x^2-21x}_{GCF = 3x} \underbrace{+10x-35}_{GCF = 5}=0$

$$3x(2x-7)+5(2x-7)=0$$

$$(2x-7)(3x+5)=0$$

quadratic formula: $\quad 6x^2 \boxed{-11}x - 35 = 0$

$a \quad b \quad c$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

let's find $\quad b^2-4ac = (-11)^2 - 4 \cdot 6 \cdot (-35) = 961$

note that $\sqrt{961} = \boxed{31}$

hence,
$$x_{1,2} = \frac{-(-11) \pm \boxed{31}}{2 \cdot (6)} = \frac{11 \pm 31}{12}$$

$$\frac{11+31}{12} = \frac{42}{12} = 3.5 \qquad \frac{11-31}{12} = -\frac{\cancel{20}^{5}}{\cancel{12}_{3}} = -\frac{5}{3}$$

Answer: $\boxed{-\frac{5}{3},\ 3.5}$

Quadratic formula gave us the zeros right away.
For the first two methods (trial and ac) we need to finish solving the equation

$$(2x-7)(3x+5)=0$$

$2x-7=0 \quad$ or $\quad 3x+5=0$

$x = \frac{7}{2} \qquad\qquad x = -\frac{5}{3}$

Answer: $\boxed{-\frac{5}{3},\ \frac{7}{2}=3.5}$

#26 (c) $h(x) = (x^2-1)(x-2)(3x+5)$

To find all the zeros we need to solve equation

$$(x^2-1)(x-2)(3x+5) = 0$$

$x^2 - 1 = 0$ or $x-2=0$ or $3x+5=0$

$x^2 = 1$ $\qquad$ $x = 2$ $\qquad$ $x = -5/3$

$x = \pm\sqrt{1} = \pm 1$

$x = 1, -1$

Answer: $\boxed{-5/3, \ -1, 1, 2}$

#27 $f(x) = -4x^2 + x^3 + 8x - 5$

First, re-write $f(x)$ in decreasing powers of x:

$f(x) = x^3 - 4x^2 + 8x - 5$

$a_3 = 1$ leading coefficient $\qquad$ a_0, constant term

$$\text{all possible rational zeros} = \frac{\text{all factors of } a_0}{\text{all factors of } a_3} = \frac{\text{all factors of } -5}{\text{all factors of } 1}$$

$$= \frac{\pm 1, \pm 5}{\pm 1} = \pm 1, \pm 5 = \boxed{-1, -5, 1, 5}$$