

Real Zero of Polynomials  
 Sec 2.3 p170 # 41-57 odd, ~~48~~

#41)  $2x^3 - 15x^2 + 27x - 10 = 0, x = \frac{1}{2}$

$$\begin{array}{r|rrrr} \frac{1}{2} & 2 & -15 & 27 & -10 \\ & \downarrow & & & \\ & 2 & -14 & 20 & 0 \end{array}$$

$$\begin{aligned} &= (x - \frac{1}{2})(2x^2 - 14x + 20) \\ &= (x - \frac{1}{2})(2x - 4)(x - 5) \\ \text{Zeros} &= \frac{1}{2}, 2, 5 \end{aligned}$$

#43)  $x^3 + 2x^2 - 2x - 4 = 0, x = -2$

$$\begin{array}{r|rrrr} -2 & 1 & 2 & -2 & 4 \\ & \downarrow & & & \\ & 1 & 0 & -2 & 8 \end{array}$$

#45)  $f(x) = 2x^3 + x^2 - 5x + 2; (x+2), (x-1)$

a) 
$$\begin{array}{r|rrrr} -2 & 2 & 1 & -5 & 2 \\ & \downarrow & & & \\ & 2 & -3 & 1 & 0 \end{array} \quad \begin{array}{r|rr} 1 & 2 & -3 & 1 \\ & \downarrow & & \\ & 2 & -1 & 0 \end{array}$$

b) Remaining factors:  
 $(2x - 1)$

c)  $f(x) = (x+2)(x-1)(2x-1)$

d) Real zeros:  $-2, 1, \frac{1}{2}$



b)  ~~$f(x) =$~~  Remaining Factors  
 $x^2 - 3x + 2 = (x-2)(x-1)$

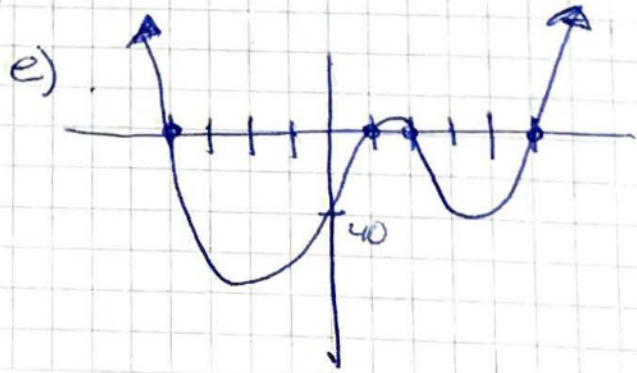
c)  $f(x) = (x-5)(x+4)(x-2)(x-1)$

#47)  $f(x) = x^4 - 4x^3 - 15x^2 + 58x - 40$   
 $(x-5), (x+4)$

d) Real zeros:  $5, -4, 2, 1$

a) 
$$\begin{array}{r|rrrrr} 5 & 1 & -4 & -15 & 58 & -40 \\ & \downarrow & & & & \\ & 5 & -24 & -10 & 8 & 0 \end{array}$$

$$\begin{array}{r|rrrr} -4 & 1 & 1 & -10 & 8 \\ & \downarrow & & & \\ & 1 & -3 & -2 & 0 \end{array}$$



#49)  $f(x) = 6x^3 + 41x^2 - 9x - 14; (2x+1)(3x-2)$   
 $x = -\frac{1}{2}, \frac{2}{3}$

$$\begin{array}{r|rrrr} -\frac{1}{2} & 6 & 41 & -9 & -14 \\ & \downarrow & -3 & -18 & 14 \\ \hline & 6 & 38 & -28 & 0 \end{array}$$

$$\begin{array}{r|rrrr} \frac{2}{3} & 6 & 38 & -28 \\ & \downarrow & 4 & 28 \\ \hline & 6 & 42 & 0 \end{array}$$

#51)  $f(x) = \frac{1}{8}x^3 + 3x^2 - x - 3$

Possible rational zero:  $\frac{p}{q} = \frac{\pm 1, \pm 3}{\pm 1}$   
 $= \pm 1, \pm 3$

Zero show on graph:  $-3, -1, 1$

#53)  $f(x) = \frac{2}{8}x^4 - 17x^3 + 35x^2 + 9x - 45$

possible zeros:  $\frac{p}{q} = \frac{\pm 1, \pm 3, \pm 5, \pm 9, \pm 45}{\pm 1, \pm 2}$

$= \pm 1, \pm 3, \pm 5, \pm 9, \pm 45, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{5}{2}$   
 $\pm \frac{9}{2}, \pm \frac{45}{2}$

Zeros from graph:

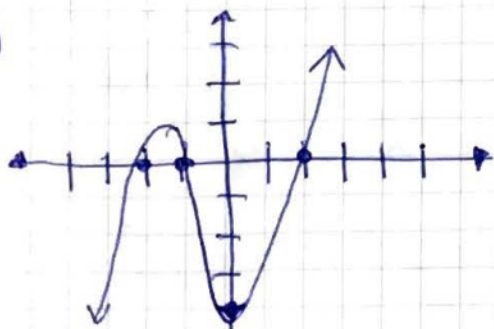
$-1, \frac{3}{2}, 3, 5$

#55)  $f(x) = \frac{1}{8}x^3 + x^2 - 4x - 4$

a) Possible rational zeros:

$\frac{p}{q} = \frac{\pm 1, \pm 2, \pm 4}{\pm 1}$   
 $= \pm 1, \pm 2, \pm 4$

b)



c) zeros:  $-2, -1, 2$  on graph

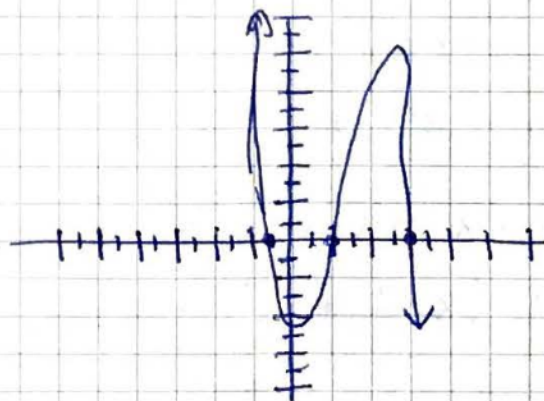
#57)  $f(x) = \frac{-4}{8}x^3 + 15x^2 - 8x - 3$

a) Possible zeros:

$\frac{p}{q} = \frac{\pm 1, \pm 3}{\pm 1, \pm 2, \pm 4}$

$\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{4}, \pm \frac{3}{4}$

b)



c)  $\frac{1}{4}, 1, 3$  on graph

