

Day 3 - Polynomials EOC Practice Solutions

1.
$$\begin{array}{r|rrrrr} -3 & 1 & 5 & 3 & -13 & -12 \\ & & \downarrow & -3 & -6 & 9 & 12 \\ \hline -1 & 1 & 2 & -3 & -4 & \text{R} \\ & & -1 & -1 & 4 & \\ \hline & 1 & 1 & -4 & \text{R} & \end{array}$$

$x = -3 \rightarrow (x+3)$
 $x = -1 \rightarrow (x+1)$

D.

$(x^2 + x - 4) \leftarrow$ Not factorable

2. $2x^5 - 58x^3 + 200x$
 $2x(x^4 - 29x^2 + 100)$
 $2x(x^2 - 25)(x^2 - 4)$
 $2x(x+5)(x-5)(x+2)(x-2)$ D.

3. $2x^3 - 9x^2 + 7x + 6 \leftarrow$ Not factorable
 Check x -intercepts in calc.

$x = 2 \rightarrow (x-2)$
 $x = 3 \rightarrow (x-3)$ C.

$$\begin{array}{r|rrrr} 2 & 2 & -9 & 7 & 6 \\ & & 4 & -10 & -6 \\ \hline 3 & 2 & -5 & -3 & \text{R} \\ & & 6 & 3 & \\ \hline & 2 & 1 & \text{R} & \end{array}$$

$(x-2)(2x+1)(x-3)$

$\rightarrow (2x+1)$

4. $x = -5$
 $x = i \leftarrow$ If i is a solution, then $x = -i$ is also a solution

D.

$$\begin{aligned}
 5. \quad & x^3 - 3x^2 - 4x + 12 \\
 & x^2(x-3) - 4(x-3) \\
 & (x-3)(x^2-4) \\
 & (x-3)(x+2)(x-2) = 0 \\
 & x=3 \quad x=-2 \quad x=2
 \end{aligned}$$

A
or you can look at the
x-intercepts on the calc.

$$\begin{aligned}
 6. \quad & x=2 \quad (x-2)(x-1)(x+1) \\
 & x=1 \quad (x-2)(x^2-1) \\
 & x=-1 \quad x^3 - 1x - 2x^2 + 2 \quad \text{or} \quad x^3 - 2x^2 - 1x + 2 \quad B.
 \end{aligned}$$

$$7. \quad (x^4 - 16)(3x^2 - 21)(4x^2 + 1)$$

$ \begin{aligned} x^4 - 16 &= 0 \\ (x^2 + 4)(x^2 - 4) &= 0 \\ (x^2 + 4)(x+2)(x-2) &= 0 \\ x^2 = \sqrt{-4} \\ x = \pm 2i & \quad \uparrow \\ & \text{complex} \end{aligned} $	$ \begin{aligned} 3x^2 - 21 &= 0 \\ 3x^2 &= 21 \\ x^2 &= 7 \\ x = \pm \sqrt{7} & \quad \uparrow \\ & \text{irrational} \end{aligned} $	$ \begin{aligned} 4x^2 + 1 &= 0 \\ 4x^2 &= -1 \\ x^2 &= -\frac{1}{4} \\ x = \pm \frac{1}{2}i & \quad \uparrow \\ & \text{complex} \end{aligned} $
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Only 2 Rational Solutions D.

$$\begin{aligned}
 8. \quad & (3x-2) = 0 \quad (x^2-1) = 0 \quad (x+4) = 0 \quad D. \\
 & 3x = 2 \quad (x+1)(x-1) = 0 \quad x = -4 \\
 & x = \frac{2}{3} \quad \cdot \quad x = -1 \quad x = 1
 \end{aligned}$$

$$13. \quad x=3 \quad x=5 \quad x=-\frac{2}{3}$$

$$(x-3)(x-5)(3x+2)$$

$$(x^2-8x+15)(3x+2)$$

$$3x^3+2x^2-24x^2-16x+45x+30$$

$$= 3x^3 - 22x^2 + 29x + 30$$

$$14. \quad (2x-5)(x-1-3i)(x-1+3i)$$

$$(2x-5)(x^2-1x+3ix)$$

$$\begin{array}{cccc} -1x & +1 & -3i & +9 \\ & -3ix & +3i & (-9i^2) \end{array}$$

$$= (2x-5)(x^2-2x+10)$$

$$= 2x^3 - 4x^2 + 20x$$

$$-5x^2 + 10x - 50$$

$$= 2x^3 - 9x^2 + 30x - 50$$

EOC Practice - Polys

$$1. \quad 3(x^2+2) - 5(2x^2+3x-4) + 2(-x^2-4)$$

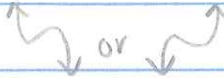
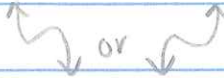
$$3x^2 + 6 - 10x^2 - 15x + 20 - 2x^2 - 8$$

$$-9x^2 - 15x + 18 \quad C.$$

$$2. \quad (3x+2)(x-5) - 6(x-1)$$

$$3x^2 - 15x + 2x - 10 - 6x + 6$$

$$3x^2 - 19x - 4 \quad D.$$

3. Cubic function \rightarrow has to look like  or 
has to touch x-axis twice. A.

4. $4t^3 - 2t^2 + t - 10$ ← graph on calculator
 See how many times it crosses the
 x-axis

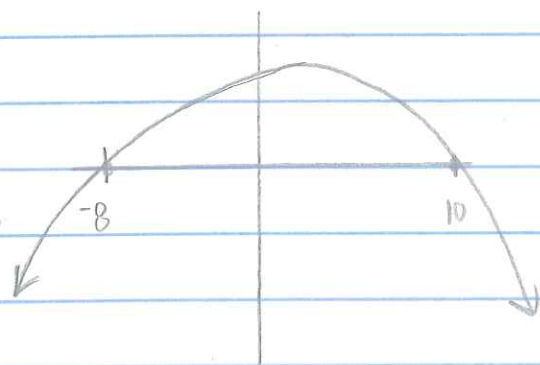
Only crosses once → C.

5. $h(t) = -\frac{1}{20}t^2 + \frac{1}{10}t + 4$

$0 = -\frac{1}{20}t^2 + \frac{1}{10}t + 4$

← type in calc.

← look at x intercepts



~~$t = -8$~~ or $t = 10$ D.
 can't have
 negative time

6. $(x^3 - 3x^2)(4x + 12)$

$x^2(x-3) - 4(x-3)$

$(x^2 - 4)(x-3)$

$(x+2)(x-2)(x-3)$

$x = -2 \quad x = 2 \quad x = 3 \quad A.$

7. Look at graph on calculator! 3 times B

8. $x^4 - 1$

$x^2 + 1 = 0 \quad D.$

$(x^2 + 1)(x^2 - 1)$

$x^2 = -1$

$(x^2 + 1)(x+1)(x-1)$

$x = \pm i$

$x^2 + 1 = 0 \quad x + 1 = 0 \quad x - 1 = 0$

$x = -1 \quad x = 1$

9. $(x+2)^2(x^2+1)(x-5)^3$
 $= (x+2)(x+2)(x^2+1)(x-5)(x-5)(x-5)$
 $x=-2 \quad x=-2 \quad x^2+1=0 \quad x=5 \quad x=5 \quad x=5$
 $x^2 = -1$
 $x = \pm i$
 \uparrow Not an x-int.

$x=-2$ & $x=5$
 only 2! A.

10. Since the graph is a 5th degree it has 5 solutions/roots. Since it crosses the x-axis 3 times, there must be 3 real roots. Therefore, the other 2 must be complex or imaginary.

B.

11. $2x^5 + 3x^4 + 11x^3 + 24x^2 - 63x - 27 \quad x = 1.5$

1.5	2	3	11	24	-63	-27
	3	9	30	81	27	
	2	6	20	54	18	0

Only 1 rational

Crosses 3 times so other 2 must be irrational

C.

then 2 more must be imaginary