

## 2.21 Homework: Polynomials exam review

1. Which expression is equivalent to  $2(5x - 2)(x + 1)(x - 3)$ ?

(a)  $5x^3 - 24x^2 - 22x - 12$

(b)  $10x^3 - 24x^2 - 22x + 6$

(c)  $2x^3 - 24x^2 - 22x + 12$

(d)  $10x^3 - 24x^2 - 22x + 12$

Leading coefficient  
 $2 \times 5 \times 1 \times 1 = 10 \quad x^3$   
Constant  
 $2(-2)(1)(-3) = +12$

2. The polynomial  $p$  is a function of  $x$ . The graph of  $p$  has three zeros at  $7$ ,  $\frac{2}{3}$ , and  $-1$ . Select **all** the expressions that could represent  $p$ .

(a)  $(x - 7)(x - \frac{2}{3})(x + 1)$

(b)  $(x - 7)(3x - 2)(x - 1)$

(c)  $3(x - 7)(x - \frac{2}{3})(x + 1)$

(d)  $3x(x + 7)(x + \frac{2}{3})(x - 1)^2$

(e)  $(x - 7)(x + \frac{2}{3})(x - 1)$

(f)  $(x - 7)(3x - 2)(x + 1)$

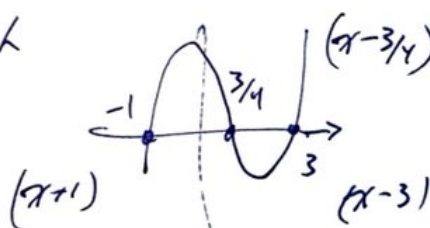
(g)  $3(x - 7)(x - \frac{2}{3})(x - 1)$

(h)  $3x(x + 7)(x - \frac{2}{3})(x + 1)^2$

$x - 7 \quad (x - \frac{2}{3}) \quad x + 1$   
or  $(3x - 2)$

3. Let  $f$  be a polynomial function of  $x$  where  $f(x) = 4x^3 - 11x^2 - 6x + 9$ . If  $x - 3$  is a factor of  $f$ , write an equation for  $f$  as a product of linear factors.

SOLUTION 1: graph  
 $f(x) = 4(x+1)(x-\frac{3}{4})(x-3)$   
 $= (x+1)(4x-3)(x-3)$



SOLUTION 2: long division  
 $f(x) = (x-3)(4x^2+x-3)$   
 $= (x-3)(4x-3)(x+1)$

$$\begin{array}{r} 4x^2 + x - 3 \\ x-3 \overline{) 4x^3 - 11x^2 - 6x + 9} \\ \underline{4x^3 - 12x^2} \phantom{+ 9} \\ \phantom{4x^3} x^2 - 6x \phantom{+ 9} \\ \underline{x^2 - 3x} \phantom{+ 9} \\ \phantom{4x^3} \phantom{x^2} -3x + 9 \\ \underline{-3x + 9} \\ \phantom{4x^3} \phantom{x^2} \phantom{-3x} 0 \end{array}$$

4. Let  $P$  be a polynomial function of  $x$ , and  $P(x) = x^3 + dx^2 - 5x + 6$ . If  $x - 1$  is a factor of  $P$ , what is the value of  $d$ ? Explain or show how you know.

$$\begin{aligned} P(1) &= 1^3 + d(1)^2 - 5(1) + 6 = 0 \\ d + 2 &= 0 \\ d &= -2 \end{aligned}$$

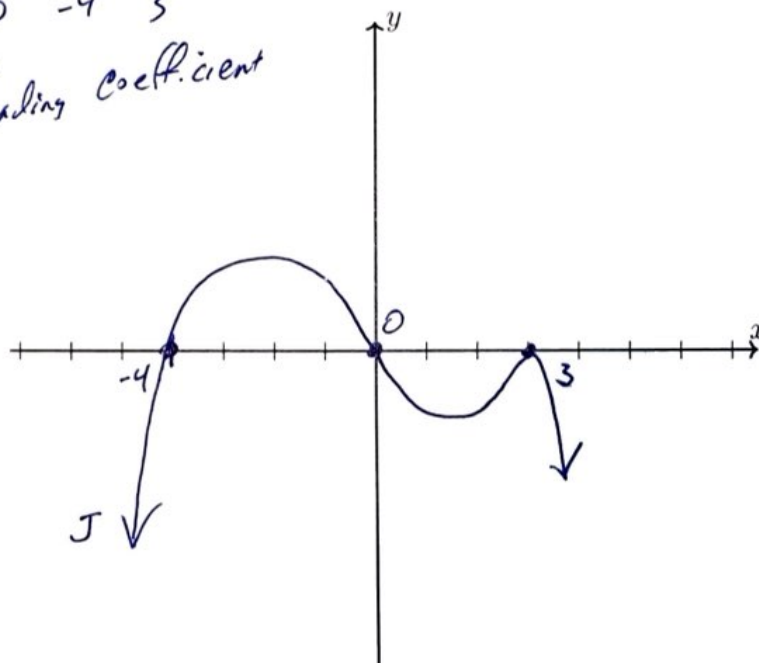
$$\begin{aligned} x=1, y=0 \\ \& P(1) = 0 \end{aligned}$$

5. Let  $j(x) = -x(x+4)(x-3)^2$  be a polynomial function.

0 -4 3



degree 4  
negative leading coefficient



- (a) Sketch a graph of the function.

- (b) Name all horizontal and vertical intercepts of the graph.

$(-4, 0)$ ,  $(0, 0)$ ,  $(3, 0)$

- (c) State the end behavior of  $j$ .

$$\begin{aligned} x &\rightarrow +\infty & y &\rightarrow -\infty \\ x &\rightarrow -\infty & y &\rightarrow -\infty \end{aligned}$$