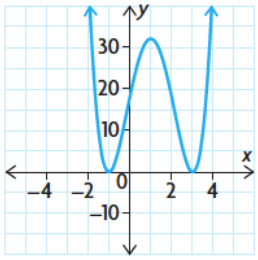
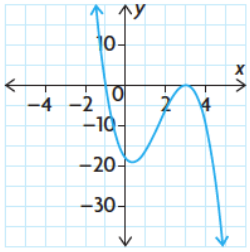
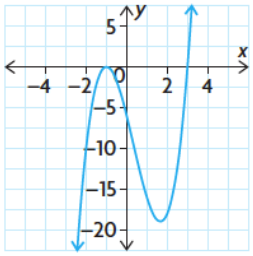
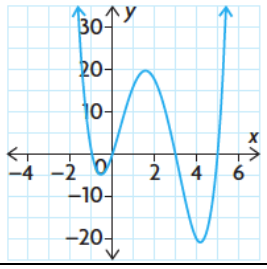
W3 – 1.3 – Factored Form Polynomial Functions
MHF4U
Jensen

1) Match each equation with the most suitable graph. Write the letter of the equation beneath the matching graph.

A) $f(x) = 2(x+1)^2(x-3)$ **B)** $f(x) = (x+1)^2(x-3)^2$

C) $f(x) = -2(x+1)(x-3)^2$ **D)** $f(x) = x(x+1)(x-3)(x-5)$

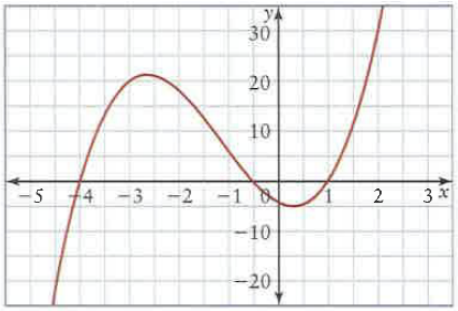
2) Complete the table

Equation	Degree	Leading Coefficient	End Behaviour	x-intercepts
$f(x) = (x-4)(x+3)(2x-1)$				
$g(x) = -2(x+2)(x-2)(1+x)(x-1)$				
$h(x) = (3x+2)^2(x-4)(x+1)(2x-3)$				
$p(x) = -(x+5)^3(x-5)^3$				

3) For each graph, state…

i) the least possible degree and the sign of the leading coefficient
ii) the x-intercepts (specify order of zero) and the factors of the function
iii) the intervals where the function is positive/negative

a)



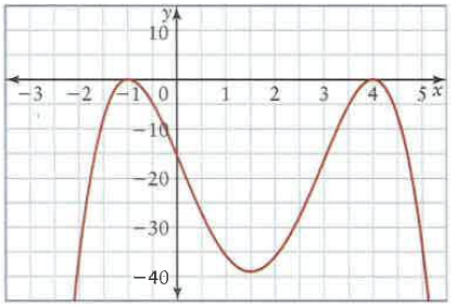
i) degree:
leading coefficient:

ii) x-intercepts:
factors:

iii)

Interval				
Sign				

b)



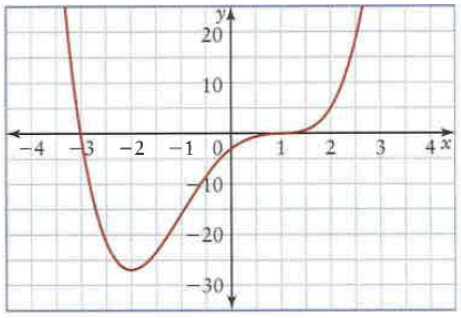
i) degree:
leading coefficient:

ii) x-intercepts:
factors:

iii)

Interval			
Sign			

c)



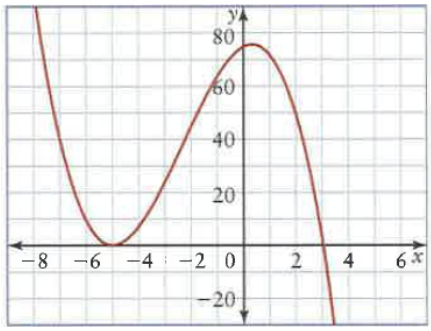
i) degree:
leading coefficient:

ii) x-intercepts:
factors:

iii)

Interval			
Sign			

d)



i) degree:
leading coefficient:

ii) x-intercepts:
factors:

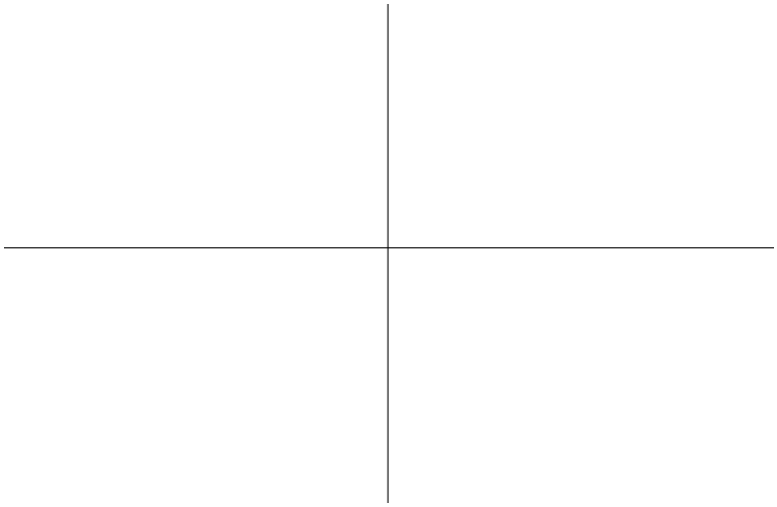
iii)

Interval			
Sign			

4) For each function, complete the chart and sketch a possible graph of the function labelling key points.

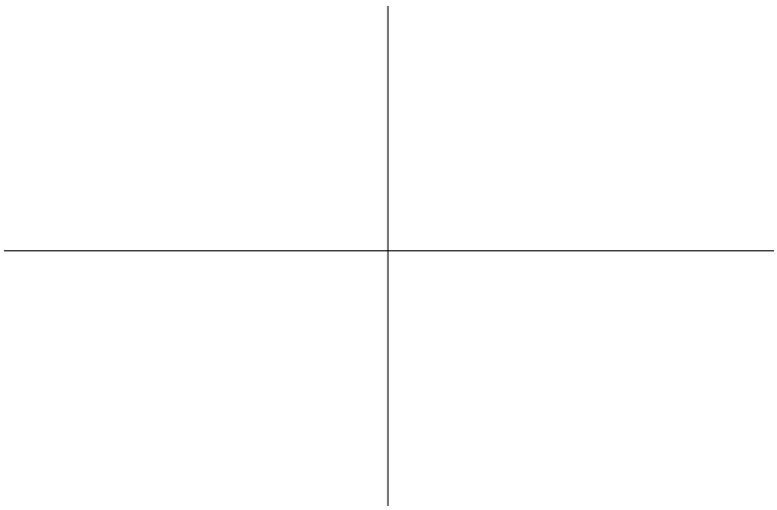
a) $f(x) = -2(x-3)(x+2)(4x-3)$

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept



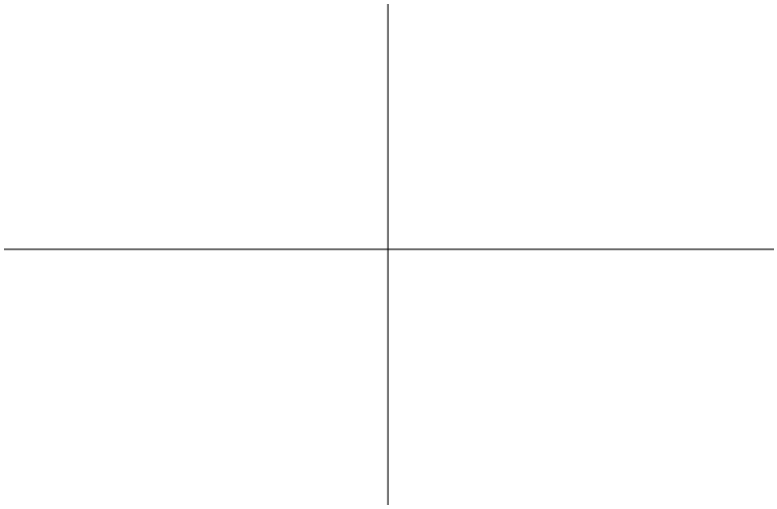
b) $g(x) = (x-1)(x+3)(1+x)(3x-9)$

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept



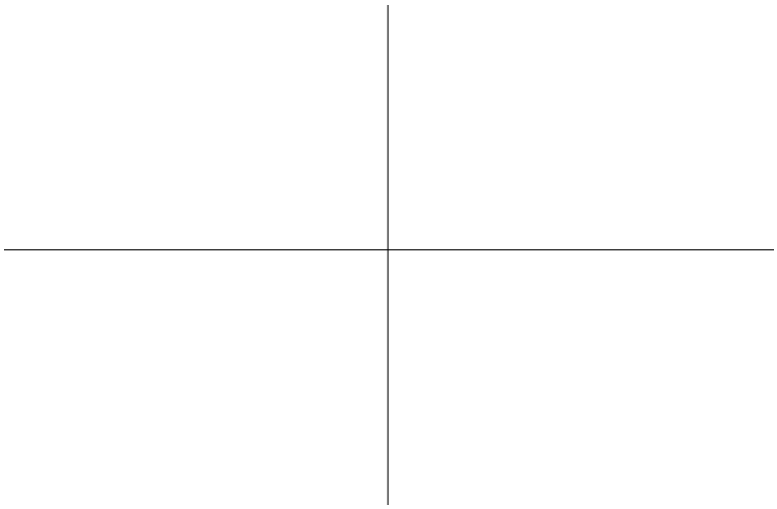
c) $h(x) = -(x+4)^2(x-1)^2(x+2)(2x-3)$

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept



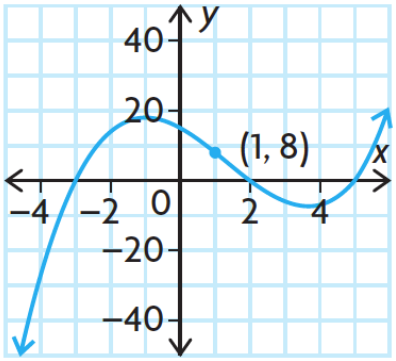
d) $p(x) = 3(x+6)(x-5)^2(3x-2)^3$

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept

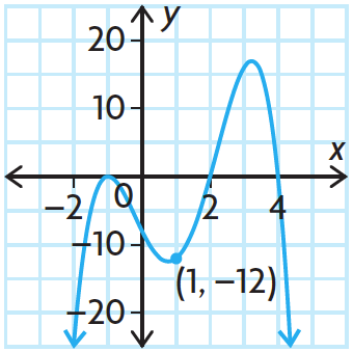


5) Write the equation of each function

a)



b)



6) Determine an equation for a quintic function with zeros -1 (order 3) and 3 (order 2) that passes through the point (-2, 50)

7) Determine the zeros of $f(x) = (2x^2 - x - 1)(x^2 - 3x - 4)$

Answer Key

1) B C A D

2)

Equation	Degree	Leading Coefficient	End Behaviour	x-intercepts
$f(x) = (x-4)(x+3)(2x-1)$	3	2	Q3 → Q1	(4, 0) (-3, 0) $\left(\frac{1}{2}, 0\right)$
$g(x) = -2(x+2)(x-2)(1+x)(x-1)$	4	-2	Q3 → Q4	(-2, 0) (-1, 0) (1, 0) (2, 0)
$h(x) = (3x+2)^2(x-4)(x+1)(2x-3)$	5	18	Q3 → Q1	(4, 0) (-1, 0) $\left(-\frac{2}{3}, 0\right)$ $\left(\frac{3}{2}, 0\right)$
$p(x) = -(x+5)^3(x-5)^3$	6	-1	Q3 → Q4	(-5, 0) (5, 0)

3) a) **i)** degree: 3
leading coefficient: positive

ii) x-intercepts: -4, -0.5, 1
factors: $(x+4)$, $(2x+1)$, and $(x-1)$

iii)

Interval	$(-\infty, -4)$	$(-4, -0.5)$	$(-0.5, 1)$	$(1, \infty)$
Sign	-	+	-	+

b) **i)** degree: 4
leading coefficient: negative

ii) x-intercepts: -1 (order 2), 4 (order 2)
factors: $(x+1)^2$, and $(x-4)^2$

iii)

Interval	$(-\infty, -1)$	$(-1, 4)$	$(4, \infty)$
Sign	-	-	-

c) **i)** degree: 4
leading coefficient: positive

ii) x-intercepts: -3, 1 (order 3)
factors: $(x+3)$, and $(x-1)^3$

iii)

Interval	$(-\infty, -3)$	$(-3, 1)$	$(1, \infty)$
Sign	+	-	+

d) **i)** degree: 3
leading coefficient: negative

ii) x-intercepts: -5 (order 2), 3
factors: $(x+5)^2$, and $(x-3)$

iii)

Interval	$(-\infty, -5)$	$(-5, 3)$	$(3, \infty)$
Sign	+	+	-

4) a)

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept
3	-8	Q2 → Q4	(3, 0) (-2, 0) $\left(\frac{3}{4}, 0\right)$	(0, -36)

b)

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept
4	3	Q2 → Q1	(1, 0) (-3, 0) (-1, 0) (3,0)	(0, 27)

c)

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept
6	-2	Q3 → Q4	(-4, 0) order 2 (1, 0) order 2 (-2, 0) (1.5,0)	(0, 96)

d)

Degree	Leading Coefficient	End Behaviour	x-intercepts	y-intercept
6	81	Q2 → Q1	(-6, 0) (5, 0) order 2 $\left(\frac{2}{3}, 0\right)$ order 3	(0, -3600)

5) a) $y = 0.5(x+3)(x-2)(x-5)$ **b)** $y = -(x+1)^2(x-2)(x-4)$

6) $y = -2(x+1)^3(x-3)^2$

7) 4, 1, -1, and -0.5