

Q4 - Review A

Write an equation for the linear function f satisfying the given conditions.

1. $f(-3) = -2$ and $f(4) = -9$ 2. $f(-3) = 6$ and $f(1) = -2$

$(-3, -2) \quad (4, -9)$
 $\frac{-9 + 2}{4 + 3} = \frac{-7}{7} = -1 \quad y = -1(x + 3) - 2$
 $y = -x - 3 - 2$
 $y = -x - 5$

Using a calculator, find all extrema and x-intercepts of the polynomial. Identify each extrema as a local or absolute max or min.

3. $f(x) = -8x^2 + 16x - 19$

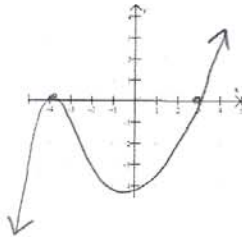
abs. max = -11
no x-intercepts

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

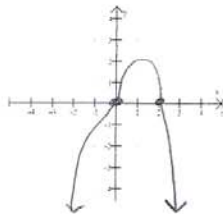
x-int: -1.881
no max or min

Sketch a graph each polynomial without using a calculator.

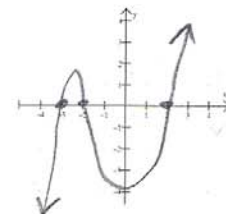
5. $f(x) = (x-3)(x+4)^2$



6. $f(x) = -x^3(x-2)$



7. $f(x) = x^3 + 3x^2 - 4x - 12$



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

Divide using synthetic or long division.

8. $\frac{x^3 - 4x^2 + 8x - 8}{x - 2}$

$\begin{array}{r} 2 \overline{) 1 \ -4 \ 8 \ -8} \\ \underline{2 \ -4 \ 8} \\ 1 \ -2 \ 4 \ 0 \end{array}$
 $x^2 - 2x + 4$

9. $\frac{4x^4 - 7x^2 + 5x - 3}{2x + 1}$

$\begin{array}{r} 2x + 1 \overline{) 4x^4 - 7x^2 + 5x - 3} \\ \underline{4x^4 + 0x^3 - 7x^2 + 5x - 3} \\ -4x^4 + 2x^3 \\ \underline{-4x^4 + 2x^3} \\ -2x^3 - 7x^2 + 5x - 3 \\ \underline{2x^3 + x^2} \\ -6x^2 + 5x - 3 \\ \underline{6x^2 + 3x} \\ 8x - 3 \\ \underline{-8x + 4} \\ -7 \end{array}$

10. $\frac{x^5 + 7x^4 + x^2 - 2}{x^2 - 3}$

$\begin{array}{r} x^3 + 7x^2 + 22 + \frac{64}{2x-3} \\ x^2 + 0x - 3 \overline{) x^5 + 7x^4 + 0x^3 + x^2 + 0x - 2} \\ \underline{-x^5 + 0x^4 + 3x^3} \\ 7x^4 + 3x^3 + x^2 + 0x - 2 \\ \underline{-7x^4 + 21x^3 + 21x^2} \\ 22x^3 + 0x^2 + 0x - 2 \\ \underline{-22x^3 + 66x^2 + 66x} \\ 64 \end{array}$

Find all zeros of each polynomial.

11. $f(x) = 2x^4 - 7x^3 - 2x^2 - 7x - 4$

$\begin{array}{r} 4 \overline{) 2 \ -7 \ -2 \ -7 \ -4} \\ \underline{8 \ 4 \ 8 \ 4} \\ -1 \ 2 \ 1 \ 0 \end{array}$
 $\begin{array}{r} -\frac{1}{2} \overline{) 2 \ 1 \ 2 \ 1 \ 0} \\ \underline{-1 \ 0 \ -1 \ 0} \\ 2 \ 0 \ 2 \ 0 \ 0 \end{array}$
 $2x^2 + 2 = 0 \quad x^2 = -1$
 $x = \pm i, 4, -\frac{1}{2}$

12. $f(x) = 3x^4 + 10x^3 - 11x^2 - 10x + 8$

$\begin{array}{r} -1 \overline{) 3 \ 10 \ -11 \ -10 \ 8} \\ \underline{-3 \ -7 \ 18 \ -8} \\ -4 \ 3 \ 7 \ -18 \ 8 \ 0 \\ \underline{-12 \ 20 \ -8} \\ 3 \ -5 \ 2 \ 0 \end{array}$
 $3x^2 - 5x + 2$
 $(3x - 2)(x - 1) \quad x = 1, \frac{2}{3}$
 zeros: $-1, -4, 1, \frac{2}{3}$

13. $f(x) = x^3 + 2x^2 - 34x + 7$

$$\begin{array}{r|rrrr} -7 & 1 & 2 & -34 & 7 \\ & & -7 & 35 & -7 \\ \hline & 1 & -5 & 1 & 0 \end{array}$$

$$x^2 - 5x + 1$$

$$x = \frac{5 \pm \sqrt{25 - 4(1)(1)}}{2(1)}$$

zeros

$$x = \frac{5 \pm \sqrt{21}}{2}, -7$$

14. $f(x) = 2x^4 + x^3 + x^2 + x - 1$

$$\begin{array}{r|rrrrr} -1 & 2 & 1 & 1 & 1 & -1 \\ & & -2 & 1 & -2 & 1 \\ \hline \frac{1}{2} & 2 & -1 & 2 & -1 & 0 \\ & & 1 & 0 & 1 & \\ \hline & 2 & 0 & 2 & 0 & \end{array}$$

$$2x^2 + 2 = 0$$

$$x^2 = -1$$

$$x = \pm i$$

$$\text{zeros: } -1, \frac{1}{2}, \pm i$$

Write the function as a product of linear and irreducible quadratic factors all with real coefficients.

15. $f(x) = x^3 - x^2 - x - 2$

$$\begin{array}{r|rrrr} 2 & 1 & -1 & -1 & -2 \\ & & 2 & 2 & 2 \\ \hline & 1 & 1 & 1 & 0 \end{array}$$

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

Write a polynomial in standard form whose zeros and their multiplicities include those listed.

16. Degree 3; zeros: $\sqrt{5}, -\sqrt{5}, 3$

$$(x - \sqrt{5})(x + \sqrt{5})(x - 3)$$

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

$$x^3 - 3x^2 - 5x + 15$$

17. Degree 4; zeros: -2 (multiplicity 2), 4 (multiplicity 2)

$$f(x) = (x+2)^2(x-4)^2$$