

Practice Test

Show work for full credit. Circle, box, or highlight your answers when answer lines are not given.

Each question is worth 5 points

Write each function in standard form, classify it by degree and number of terms (fancy names):

1. $y = x^2 + 7 - 3x^3$ $y = -3x^3 + x^2 + 7$, cubic trinomial

2. $y = 2x^3 + 5x^2 - x^4 + 12$ $y = -x^4 + 2x^3 + 5x^2 + 12$, quartic polynomial

3. Give an example of a quintic binomial: — varies —
needs 5th degree, two terms

Determine the right end behavior for each polynomial function:

5. $y = 2x^3 + x^2 - x^4$
down

6. $y = -3x^2 - x^5 + 7$
down

Write a polynomial function in factored form with the given zeros:

7. $x = \{-1, -3, 7\}$

$y = (x+1)(x+3)(x-7)$

8. $x = \{-1, 0, 5\}$

$y = x(x+1)(x-5)$

-more-

Find the zeros of each function. State the multiplicity of any multiple zeros:

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

$x = 0$, mult 2

$x = -5$, mult 3

10. $y = x^4 - 6x^3 + 8x^2$

$x^2(x^2 - 6x + 8)$

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

$x = 0$ mult 2, $x = 4$, 2

Find all solutions (real and imaginary) of each equation:

11. $x^2 - 10x = -24$

$x^2 - 10x + 24 = 0$

$(x-6)(x-4) = 0$

$x = \{6, 4\}$

12. $2x^3 + 4x = 2x^2$

$2x^3 - 2x^2 + 4x = 0$

$2x(x^2 - x + 2) = 0$

$2x = 0$

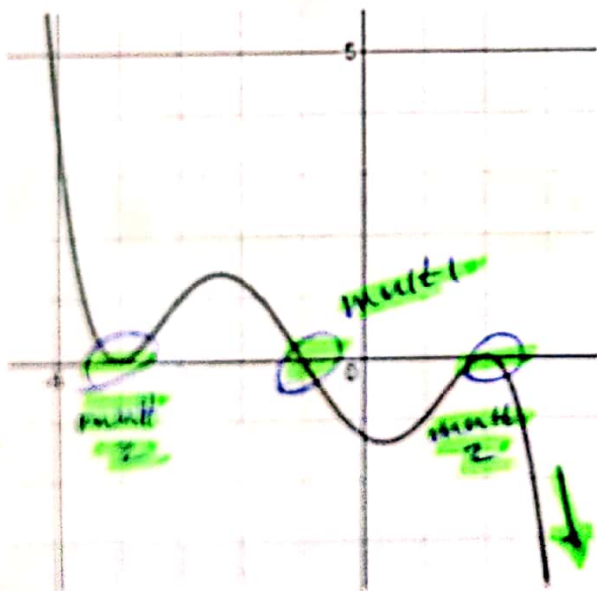
$x = 0$

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

$x = \left\{ 0, \frac{1 \pm i\sqrt{7}}{2} \right\}$

Write an equation of lowest possible degree in factored form for the polynomial function shown below.

13.



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

Divide using long division. Write any remainder as a fraction of the divisor:

14. $(x^3 + 7x^2 + 15x + 7) \div (x + 2)$

$$\begin{array}{r} x^2 + 5x + 5 + \frac{-3}{x+2} \\ x+2 \overline{) x^3 + 7x^2 + 15x + 7} \\ \underline{-(x^3 + 2x^2)} \\ 5x^2 + 15x \\ \underline{-(5x^2 + 10x)} \\ 5x + 7 \\ \underline{-(5x + 10)} -3 \end{array}$$

Divide using synthetic division. Write any remainder as a fraction of the divisor:

15. $(5x^3 + 8x^2 - 60) \div (x - 3)$ *place holder!*

$$\begin{array}{r|rrrr} 3 & 5 & 8 & 0 & -60 \\ & & 15 & 69 & 207 \\ \hline & 5 & 23 & 69 & 147 \end{array}$$

$$5x^2 + 23x + 69 + \frac{-147}{x-3}$$

List the possible rational roots of $P(x)$ given by the Rational Root (Locator) Theorem:

16. $P(x) = 3x^3 - x^2 - 7x + 4$

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

$$\frac{1}{3}$$

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

Write a polynomial function with the given roots:

17. -5 and $2i$
 $-2i$ also

$$y = (x + 5)(x - 2i)(x + 2i)$$

$$y = (x + 5)(x^2 + 4)$$
-more-

no need to FOIL this out

Use Descartes' Rule of Signs to determine the possible number of positive and negative real zeros:

18. $P(x) = 5x^3 - 7x^2 - 2x - 1$

pos: $+ \rightarrow - - -$

neg: $- \rightarrow + \rightarrow -$

1 pos real root

2 or 0 neg real roots

answer

Find all the zeros for each function:

19. $P(x) = 2x^3 - 3x^2 + 3x - 2$

candidates: $\pm \{1, 1/2, 2\}$

$$\begin{array}{r} 1) \quad 2 \quad -3 \quad 3 \quad -2 \\ \quad \quad 2 \quad -1 \quad 2 \\ \hline 2 \quad -1 \quad 2 \quad 0 \end{array}$$

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

doesn't factor, use quad. formula

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

$$x = \frac{1 \pm i\sqrt{15}}{4}$$

$$x = \left\{ 1, \frac{1 \pm i\sqrt{15}}{4} \right\}$$

Factor each polynomial completely:

20. $27x^3 - 8$ diff. of cubes

$$(3x - 2)(9x^2 + 6x + 4)$$

"Square the 1st, opposite the product, square the last."

21. $x^4 - 16x^2 + 48$ quadratic form

$$(x^2 - 12)(x^2 - 4)$$

$$(x^2 - 12)(x - 2)(x + 2)$$

-end-