

CFA 2B - GRAPHS OF POLYNOMIALS
NO GRAPHING CALCULATOR!!!

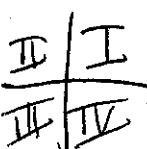
Name Key

_____ / 75 points

1. Given: $f(x) = 4 - x^3 + x^4$. How many ^{Solutions} zeros will this function have? 4 2 points

2. A function of degree 3 has two zeros that are 4 and -2. The third zero of the function will be:
 a. an imaginary number
 b. a real number
 c. could be a real number or an imaginary number depending on the equation of the function 2 points

3. A polynomial function of degree 5 with zeros -1, 0, and 3 could be: 2 points
 a. $f(x) = x^2(x+1)(x-3)$
 b. ~~$f(x) = x(x+1)^2(x-3)$~~
 c. $f(x) = x(x-1)(x+3)^3$
 d. $f(x) = x(x+1)^2(x-3)^2$
 e. ~~$f(x) = x(x+1)(x-3)$~~
 f. none of these



#4-9. Use the following information about function $f(x)$. 2 points each
 $f(0) = -3$ $f(7) = -4$ $f(3) = 0$ $f(-1) = 4$ $f(-4) = 0$ $f(-2) = 0$

4. Give the coordinates of a point on the graph of $f(x)$ that lies in Quadrant IV. (7, -4)

5. What is the y intercept of $f(x)$? (0, -3)

6. Give the zeros of $f(x)$. (3, 0) (-4, 0) (-2, 0)

7. What are the factors of $f(x)$? (x-3) (x+4) (x+2)

8. What is the least possible degree of $f(x)$? 3

9. If $f(x)$ is divided by $(x+1)$, what will be the remainder? 4

10. Find ALL the zeros of the function $f(x) = 2x^3 + 9x^2 + 10x + 3$ if $f(-1) = 0$ 4 points

$$\begin{array}{r} -1 \overline{) 2 \ 9 \ 10 \ 3} \\ \underline{2 \ 9 \ 10 \ 3} \\ 0 \end{array}$$

$$2x^2 + 7x + 3 = 0$$

$$x = -7 \pm \frac{\sqrt{49 - 4(2)(3)}}{4}$$

$$x = -7 \pm \frac{\sqrt{25}}{4}$$

$$x = \frac{-7+5}{4} = -\frac{2}{4} = -\frac{1}{2} \quad \text{and} \quad x = \frac{-7-5}{4} = -\frac{12}{4} = -3$$

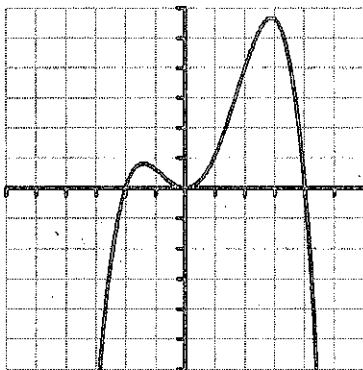
2 points each

#11-15. Use the following function: $f(x) = 3x^3(x+4)^2(2x-1)$

- 11. The graph of $f(x)$ will bounce on the x axis at $x = -4$.
- 12. True or False. None of the zeros of $f(x)$ will be imaginary. true
- 13. Name a zero of $f(x)$ that has multiplicity three. 0
- 14. The degree of $f(x)$ is 6.
- 15. Describe the end behavior of $f(x)$. $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

2 points each

#16-20. Use the function whose graph is below.



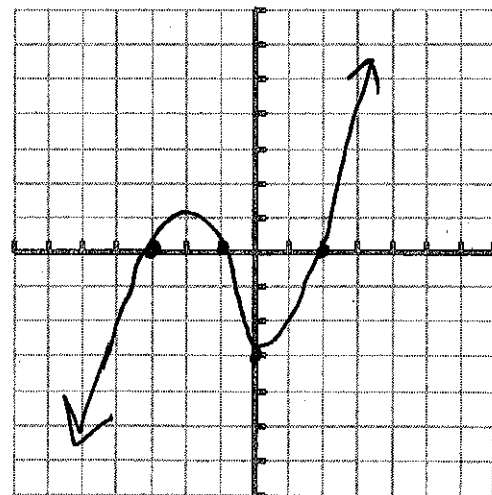
- 16. What is the least possible degree of the function? 4
- 17. Name the zeros of the function $x = -2, 0, 0, 4$
- 18. Is the leading coefficient of the function positive or negative? neg.
- 19. Write the equation for the function
 $f(x) = -x^2(x+2)(x-4)$
- 20. Describe the end behavior of the function.
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow -\infty$

2 points each + 3 points for the graph

#21-24. Use the function

$$f(x) = \frac{1}{2}(x+3)(x-2)(x+1)$$

- 21. What is the degree of $f(x)$? 3
- 22. What are the zeros of $f(x)$? $x = -3, 2, -1$
- 23. What is the y intercept of $f(x)$? $(0, -3)$
- 25. Sketch the graph of $f(x)$.



Now grab a blue copy of Part II

GRAPHING CALCULATOR IS ALLOWED

Find ALL the zeros of the following functions. (NO decimal answers!!)

Show your work in the space provided.

10 points each

1. $f(x) = 2x^4 - x^3 - 28x^2 + 9x + 90$

$x = -2, 3, -3$

$x = -2, 3, \frac{5}{2}, -3$

~~X=~~

$$\begin{array}{r} -2 \overline{) 2 \quad -1 \quad -28 \quad 9 \quad 90} \\ \underline{\downarrow -4 \quad 10 \quad 36 \quad -90} \\ +3 \overline{) 2 \quad 5 \quad -18 \quad 45 \quad 0} \\ \underline{\downarrow 6 \quad 3 \quad -45} \\ 2 \quad 1 \quad -15 \quad 0 \end{array}$$

$2x^2 + x - 15 = 0$

$x = \frac{-1 \pm \sqrt{1 - 4(2)(-15)}}{4}$

$x = \frac{-1 \pm \sqrt{121}}{4}$

$x = \frac{-1 + 11}{4} = \frac{10}{4} = \boxed{\frac{5}{2}}$

$x = \frac{-1 - 11}{4} = \frac{-12}{4} = \boxed{-3}$

2. $f(x) = x^3 - 2x^2 - 27x - 12$

$x = -4$

$x = -4, 3 \pm 2\sqrt{3}$

$$\begin{array}{r} -4 \overline{) 1 \quad -2 \quad -27 \quad -12} \\ \underline{\downarrow -4 \quad 24 \quad 12} \\ 1 \quad -6 \quad -3 \quad 0 \end{array}$$

$x^2 - 6x - 3 = 0$

$x = \frac{6 \pm \sqrt{36 - 4(1)(-3)}}{2(1)}$

$x = \frac{6 \pm \sqrt{48}}{2}$

$x = \frac{6 \pm 4\sqrt{3}}{2}$

$x = 3 \pm 2\sqrt{3}$

blue