Name: _____ 614 D – Sections 2.1-2.2

Equivalent Statements about Roots and Zeroes

The following statements are equivalent for a polynomial $f(x)$ and a real number c:

- c is a solution to the equation $f(x) = 0$.
- c is a zero of $f(x)$.
- c is a root of $f(x)$.
- x - c is a factor of $f(x)$.
- When $f(x)$ is divided by x - c, the remainder is 0.
- c is an x-intercept of the graph of $y = f(x)$.

1. State whether the function is a polynomial function. Give the zeroes of each function, if they exist.

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

yes $0 = (x-4)(x-2)$

zeros at 4 & 2

2. For what values of x is $\frac{x^2 + 5x + 6}{x + 4}$ undefined?

$x \neq -4$

3. Find the value(s) of the function $h(x) = 9x - 3x^2$.

a) $h(-1)$ b) $h(2+i)$ c) $h(0) = 0$

$-9-3 = -12$ $9(2+i) - 3(2+i)^2$

$18+9i - 3(4+4i-1)$

$18+9i - 3(3+4i) = 18+9i-9-12i = 9-3i$

4. If $P(x) = x^3 - 2x + 6$, use synthetic substitution to find $P(4)$.

4	1	0	-2	6
		4	16	56
	1	4	14	62

5. If 3 is a zero of $f(x) = 3x^3 + kx + 1$, then find the value of k.

23/

$0 = 3(3)^3 + 3k + 1$

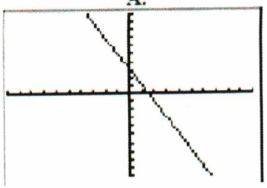
$0 = 81 + 3k + 1$

$-82 = 3k$

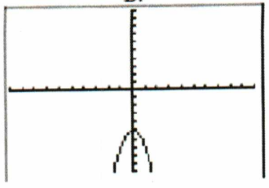
$-82/3 = k$

Match the polynomial function with its graph WITHOUT using a graphing calculator.

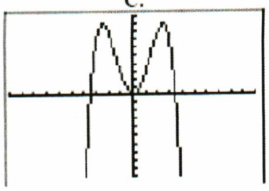
A.



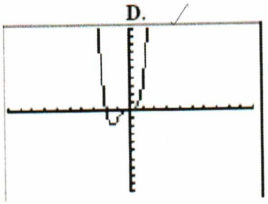
B.



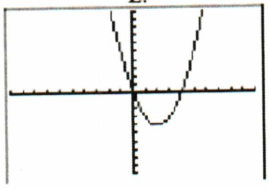
C.



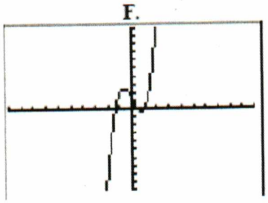
D.



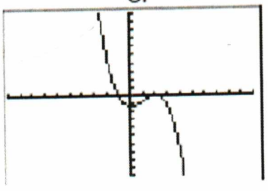
E.



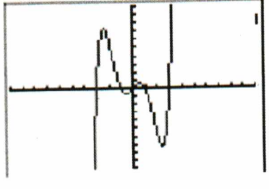
F.



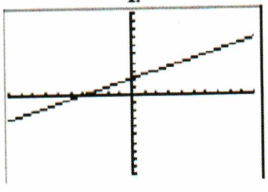
G.



H.



I.



E 12. $f(x) = x^2 - 4x$ $x(x-4)$

I 13. $f(x) = \frac{1}{2}x + 2$

A 14. $f(x) = -2x + 3$

F 15. $f(x) = 2x^3 - 3x + 1$

B 16. $f(x) = -2x^2 - 5$

D 17. $f(x) = x^4 + 2x^3$ $x^3(x+2)$

G 18. $f(x) = -\frac{1}{3}x^3 + x^2 - \frac{4}{3}$

C 19. $f(x) = -\frac{1}{4}x^4 + 3x^2$ $x^2\left(-\frac{1}{4}x^2 + 3\right)$ $x \approx 3.46$

17 20. $f(x) = \frac{1}{5}x^5 - 2x^3 + \frac{9}{5}x$