Algebra 2A

Unit 5 Review

Name Key Hr.___

5.1

1. Find $p(-4)$ if $p(x) = x^2 - x$.

$p(-4) = (-4)^2 - (-4)$

$= \boxed{20}$

2. Find $p(-6)$ if $p(x) = 2x^3 - 1$.

$p(-6) = 2(-6)^3 - 1$

$= \boxed{-433}$

For Questions 3 and 4, if $p(x) = -2x^2 + 5x + 1$ and $q(x) = x^3 - 1$, find each value.

3. $q(z^3) = (z^3)^3 - 1$

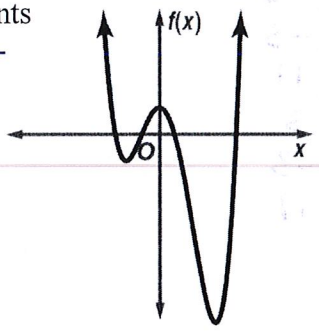
$= \boxed{z^9 - 1}$

4. $p(3m^2) = -2(3m^2)^2 + 5(3m^2) + 1$

$= -2(9m^4) + 15m^2 + 1$

$= \boxed{-18m^4 + 15m^2 + 1}$

For Questions 5-7, consider the graph below.



5. Determine whether the graph represents an odd-degree polynomial or an even-degree polynomial function.

5. even

6. State the number of real zeros.

6. 4

7. Describe the end behavior.

7. $f(x) \to$ +∞ as $x \to -\infty$

$f(x) \to$ +∞ as $x \to +\infty$

5.2

8. Use your graphing calculator to estimate the x-coordinates at which the relative maxima and relative minima occur for the function. Give the maximum and minimum value. (Approximate to the nearest thousandth.)

$f(x) = x^3 - 6x - 9$

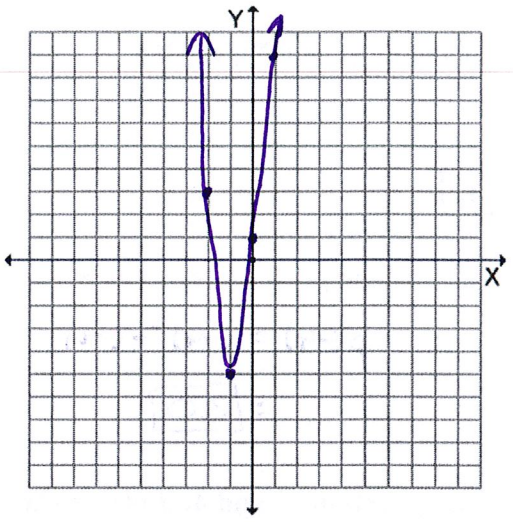
8. Rel. Max. -3.34 @ $x =$ -1.41

Rel. Min. -14.66 @ $x =$ 1.41

9. Graph the function $h(x) = x^4 + 7x + 1$ using a table of values and determine the x-value of each **real** zero. Approximate to the nearest thousandth.

X	Y
-3	61
-2	3
-1	-5
0	1
1	9
2	31

9.

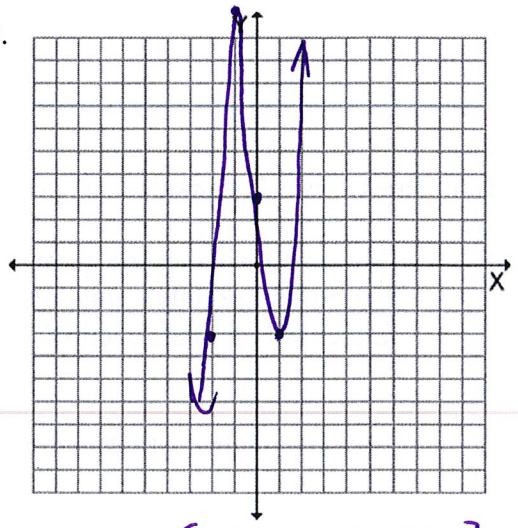


real zeros: {-1.86, -.14}

10. Graph the function $r(x) = 4x^3 + x^2 - 11x + 3$ using a table of values and determine the x-value of each **real** zero. Approximate to the nearest thousandth.

X	Y
-3	-63
-2	-3
-1	11
0	3
1	-3
2	17

10.



real zeros: {-1.90, .29, 1.36}

5.3

11. Write the polynomial $5x^{10} - 6x^5 - 3$ in quadratic form, if possible.

$u = x^5$

$5u^2 - 6u - 3$

For Questions 12 and 13, solve each equation.

12. $m^4 + 3m^3 = 40m^2$

$m^4 + 3m^3 - 40m^2 = 0$

$m^2(m^2 + 3m - 40) = 0$

$m^2(m-5)(m+8) = 0$

$m^2 = 0 \quad m-5 = 0 \quad m+8 = 0$

$\boxed{m=0} \quad \boxed{m=5} \quad \boxed{m=-8}$

13. $x^{\frac{2}{3}} - 9x^{\frac{1}{3}} + 20 = 0$

$u = x^{1/3}$

$u^2 - 9u + 20 = 0$

$(u-4)(u-5) = 0$

$u = 4 \quad u = 5$

$4 = x^{1/3} \quad 5 = x^{1/3}$

$\boxed{64 = x} \quad \boxed{125 = x}$

5.4 & 5.5

For Questions 14-17, find ALL of the zeros of the function.

14. $f(x) = x^3 - 7x^2 + 16x - 10$

1 | 1 -7 16 -10
1 -6 10
1 -6 10 | 0

$x^2 - 6x + 10$

$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(10)}}{2(1)}$

$x = \frac{6 \pm \sqrt{-4}}{2} \quad x = \frac{6 \pm 2i}{2}$

$\boxed{\{1, 3 \pm i\}}$

15. $g(x) = 10x^3 + 7x^2 - 82x + 56$

2 | 10 7 -82 56
20 54 -56
10 27 -28 | 0

$10x^2 + 27x - 28$

$x = \frac{-27 \pm \sqrt{27^2 - 4(10)(-28)}}{2(10)}$

$x = \frac{-27 \pm \sqrt{1849}}{20} \quad x = \frac{-27 \pm 43}{20}$

$\boxed{\{2, 8, -35\}}$

16. $k(x) = 4x^4 + 36x^3 + 57x^2 + 225x + 200$

-1 | 4 36 57 225 200
-4 -32 -25 -200
4 32 25 200 | 0

-8 | 4 32 25 200
-32 0 -200
4 0 25 | 0

$4x^2 + 25 = 0$

$x = \frac{0 \pm \sqrt{0^2 - 4(4)(25)}}{2(8)}$

$x = \frac{0 \pm \sqrt{-400}}{16} \quad x = \frac{\pm 20i}{16}$

$\boxed{\{-1, -8, \pm \frac{5}{4} i\}}$

17. $h(x) = 2x^3 + 2x^2 - 34x + 30$

-5 | 2 2 -34 30
-10 40 -30
2 -8 6 | 0

$2x^2 - 8x + 6 = 0$

$x = \frac{8 \pm \sqrt{(-8)^2 - 4(2)(6)}}{2(2)}$

$x = \frac{8 \pm \sqrt{16}}{4}$

$x = \frac{8 \pm 4}{4}$

$\boxed{\{-5, 3, 1\}}$

For Questions 18 and 19, write a polynomial function of least degree with integral coefficients that has the given zeros.

18. -3, 1, 2

$x=-3 \quad x=1 \quad x=2$

$(x+3)(x-1)(x-2)$

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

	x^2	$2x$	-3
x	x^3	$2x^2$	$-3x$
-2	$-2x^2$	$-4x$	6

x^3-7x+6

19. -6, 5*i*

$x=-6 \quad x=5i \quad x=-5i$

$(x+6)(x-5i)(x+5i)$

$(x+6)(x^2+25)$

$x^3+6x^2+25x+150$

5.6

For Questions 20 and 21, find $(f+g)(x)$, $(f-g)(x)$, $(f\cdot g)(x)$, and $\left(\frac{f}{g}\right)(x)$.

20. $f(x) = x^2 - 5$
$g(x) = x^2 + 5$

$(f+g)(x) = 2x^2$

$(f-g)(x) = -10$

$(f\cdot g)(x) = x^4-25$

$\left(\frac{f}{g}\right)(x) = \frac{x^2-5}{x^2+5}$

21. $f(x) = x + 2$
$g(x) = x^2 + 4x + 4$

$(f+g)(x) = x^2+5x+6$

$(f-g)(x) = -x^2-3x-2$

$(f\cdot g)(x) = x^3+6x^2+12x+8$

$\left(\frac{f}{g}\right)(x) = \frac{x+2}{(x+2)(x+2)} = \frac{1}{x+2} \quad x\neq 2$

For Questions 22 and 23, if $f(x) = x^2 + 1$ and $h(x) = x - 1$, find each value.

22. $h[f(3)] = 9$

23. $f[h(-3)] = 17$

24. Suppose $h(x) = x^2 + 2$ and $g(x) = x - 3$. Find $g[h(x)]$.

x^2-1