**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Final Exam Review 2017***

**✰My Plan for completing the ✰ Exam Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**review packet is as follows… ✰ Exam Format (tentative):**

 **51 multiple choice (1 point each)**

 **Choice of 15 short answer (3 points each)**

 **Choice of 8 long answer (6 points each)**

 **✰ There may be a non-calculator section.**

 **✰ You will be have two class periods to review before the exam date.**

**✰I also plan on doing the following to review for the exam:**

 **⭘ Reading through notes**

 **⭘ Creating unit/topic study guides**

 **⭘ Re-doing previous class/home work problems**

 **⭘ Re-doing previous quiz/test problems**

 **⭘ Reading my textbook**

 **⭘ Using online resources/videos**

 **⭘ Seeing my teacher to ask questions**

 **⭘ Collaborating with my peers**

 **⭘ Other: Please describe below.** ☺

**Final Exam Review: Rational Exponents & Radical Functions**

*You should be able to complete this whole section(p. 1-5) without a calculator!* ☺

1. **Simplify each expression. Do not include any radicals in your final answers for this section.**

|  |  |  |  |
| --- | --- | --- | --- |
| A.   | B.  | C.  | D.  |
| E.  | F.  | G.  | H.  |

2. **Simplify each expression.**

**Do not include any exponents other than positive integers in your final answers for this section.**

|  |  |  |  |
| --- | --- | --- | --- |
| A. (16b24d30)3/4   | B.  | C.  | D.  |
| E. (81y32z22)1/4  | F. (100g100f45)1/2  | G.  | H.  |

3. **Evaluate each expression.**

|  |  |  |  |
| --- | --- | --- | --- |
| A. 7292/3  | B**.** 144-3/2 | C. 271/3 \* 10,0003/4  | D. (512)-2/3 |
| E. (81)-1/2  | F. (362)-1/2  | G. 41/2 \* 100,000-1/5 | H.  |

4. **Solve each equation. Be sure to show all work.**

|  |  |  |  |
| --- | --- | --- | --- |
| A. 64 = x-3/4  | B**.** 43987x + 8 = 43984x - 2 | C. 125 = x-3/2 | D.  |
| E.  | F. 4+ x3/2 = 31  | G. 252x = 125x - 4 | H. 56789x – 13 = 56788x – 5  |

5. **Rewrite each expression as *sw*, where *w* is a fraction.**

|  |  |
| --- | --- |
| A.  | B.  |
| C.  | D.  |

6. **Solve each equation. Be sure to show all work and calculate both solutions in cases when two solutions are possible.**

|  |  |  |
| --- | --- | --- |
| A.  | B.  | C.  |
| D.  | E.  | F.  |

7. **Simplify each expression as much as possible. Be sure to show all of your steps, as you may be asked to select from multiple equivalent expressions, according to the appropriate steps.**

|  |  |  |
| --- | --- | --- |
| A.  | B.  | C.  |

8. Describe how to rewrite *xa/b* without any fractional powers, but with radicals instead.

9. Describe how to rewrite  without using any radicals

10. Describe how common bases and exponent properties can be helpful in solving equations.

 (see the next page for examples of such equations ☺)

11. **Rewrite each equation using a common base. Then solve.**

|  |  |  |
| --- | --- | --- |
| A.  | B.  | C.  |
| D. 84x-2 \* 643x – 9 = 5124x | E. 93x \* 7294x – 2 = 815x + 1 | F.  |

**Final Exam Review: Inverse Functions**

1. Determine the inverse of each relation. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. {(9,9), (3, -8), (-1, 0)} | B. {(-2, 3), (-3, -7), (-1,2)} | C.  | D.  |
| E.  | F. f(x) = ½x – 8  | G. f(x) = 3x + 1 | H.  |
| I.  | J. f(x) = 2x2 – 1 | K.  | L. f(x) = 4x2 + 8 |

2. Complete the blank. If f(x) and g(x) are inverses, then f(x) is a reflection of g(x) across the line \_\_\_\_\_\_\_\_\_\_\_\_\_.

3. Consider a function and its inverse. What must be true about f(x) and f-1(x)?

4. Prove whether or not f(x) and g(x) are inverses. (no calculator)

|  |  |
| --- | --- |
| A. f(x) = -4x + 16 g(x) = -¼x + 4  | B. f(x) = 3x – 9 g(x) = -3x – 9 |
| C. f(x) = ½x + 5 g(x) = 2x – 5  | D. f(x) = ½x – 9 g(x) = 2x + 18 |

5. If f(x) = 3x – 7, determine each of the following: (no calculator)

A.  B.  C. *f-*1(0)

6. Graph the inverse of each function on the same graph. (no calculator)

|  |  |
| --- | --- |
| A.Macintosh HD:Users:boruch:Desktop:Screen shot 2017-05-30 at 6.31.10 PM.png | B.Macintosh HD:Users:boruch:Desktop:Screen shot 2017-05-30 at 6.30.13 PM.png |
| C.Macintosh HD:Users:boruch:Desktop:Screen shot 2017-05-30 at 6.30.35 PM.png | D.Macintosh HD:Users:boruch:Desktop:Screen shot 2017-05-30 at 6.29.52 PM.png |

7. Graph each function and its inverse. Label the original f(x), and the inverse f-1(x). (no calculator)

|  |  |
| --- | --- |
| A. y = 3x – 2plane.png | B. y = 2x + 8plane.png |
| C. y = |x| - 3plane.png | D. y = |x + 1| - 2plane.png |

**Final Exam Review: Exponential Equations and Logarithms**

1. Convert each logarithmic equation to an exponential equation, and each exponential equation to a logarithmic equation. (no calc)

|  |  |  |  |
| --- | --- | --- | --- |
| A. 34 = 81 | B. 103 = 1000 | C. log28 = 3 | D. ln9 = x |
| E. bp = 12 | F. logvG = w | G. log497 = ½  | H. 4-1 = ¼  |

2. Evaluate each expression. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. log31 | B. log2¼  | C. log3(1/3) | D. log5125 |
| E. log100 | F. log4¼  | G. log1/2(16) | H. log381 |

3. Condense each expression. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. log87 + log82+ log83 | B.  | C.  | D.  |
| E. 3log57 | F.  | G. 6ln2 – 2ln4 | H. 5log82 |

4. Expand each expression. (no calculator)

|  |  |  |
| --- | --- | --- |
| A.  | B.   | C.   |
| D.  | E. log2(8 • 53 y7) | F.  |

5. Solve each equation for the variable.

|  |  |  |  |
| --- | --- | --- | --- |
| A. log3x+ log3(x – 4) = 2 | B. logx64 = 2 | C. 13*e*2x = 82 | D. log(3x – 7) = log(2x + 1) |
| E. 142x – 3 = 23 | F. log7(y) = 3 | G. log2x + log(x – 1) = 3 | H. logy27 = 3 |
| I. log(x) = 3 | J. log3(2x + 1) = log3(5x) | K. 12*e*3x = 33 | L. 9x – 2 = 21 |
| M. 3*e*x – 3 = 38 | N. logx 6 = ½ | O. 5*e*x + 8 = 18 | P. log4 8 = x + 1  |
| Q. log (x +2) – log(x + 1) = log 4  | R. log x = 9 | S. log12 (x – 3) = log 12 (-6x + 4)  | T. log (2x) – log (4) = 6  |

6. Complete each blank. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. log249 = \_\_\_\_\_ • log27 | B. log781 = \_\_\_\_\_ • log73 | C. log5100 = \_\_\_\_ • log510 | D. log2164 = \_\_\_\_\_ • log214 |

7. An item cost $1500 in 1993, and depreciated in value by 15% each year.

a. Write an equation to represent the value of the item, V(t) after t years since 1993. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. How much was the item worth after four years?

c. If the item were to actually appreciate 15% per year instead, how much would the item have been worth after four years?

**Use the equation  where *A* is the accumulated amount, *r* is the rate as a percentage, *n* is the amount of times interest is compounded per year, and *t* is the number of years for problems 8-10.**

8. Assume you place $800 in a savings account with an annual interest rate of 1.5%.

Determine the amount of the investment after 7 years of compounding, if compounding occurs monthly.

9. Assume you place $500 in a savings account with an annual interest rate of 0.5%.

Determine the amount of the investment after 3 years of compounding, if compounding occurs quarterly.

10. Assume you place $1000 in a savings account with an annual interest rate of 1.1%.

Determine the amount of the investment after 4 years of compounding, if compounding occurs monthly.

**Use the equation  for problems 11 and 12.**

11. Sharon deposited $3000 into an account. After one year, her total investment was $3045.34.

What is the annual interest rate on Sharon’s account?

12. Bryan deposited $4500 into an account. After two years, his total investment was $4563.44.

What is the annual interest rate on Bryan’s account?

13. A $53,500 car depreciates in value by 23% per year.

Write an equation V(t) to represent the value of the car *t* years after purchase. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a. How much is the car worth after three years?

b. When will the car be worth under $20,000? c. When will the car be worth under $10,000?

14. An antique car that originally cost $20,000 appreciates in value by 18% per year.

Write an equation V(t) to represent the value of the car *t* years after purchase. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a. How much is the car worth after three years?

b. When will the car be worth $50,000? c. When will the car be worth $75,000?

**Final Exam Review: Polynomials**

1. Classify each polynomial by degree and number of terms. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. 7x4 – 5x3 | B. 2x3 + 8x – 1 | C. x2 | D. 9x3 + 3 |
| E. 4x3 – x2 + x + 18 | F. -5x | G. -3x + 5 | H. 54x3 + 16 |

\*Which of the above expressions could be factored by taking out a GCF and then using the sum of cubes formula?! \_\_\_\_\_\_

2. Factor each expression completely.

|  |  |  |  |
| --- | --- | --- | --- |
| A. 12x3 + 3x2 + 8x + 2 | B. 2x4 – 14x2 – 288 | C. 6x4 – 7x2 – 24 | D.  |
| E.  | F. 30x3 – 12x2 – 15x + 6 | G. 4x4 – 12x2 - 16 | H. 8x4 – 22x2 – 63  |

3. State how many solutions each equation should have. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. f(x) = 5x2 – x + 1 + 4x3 | B. f(x) = x2 – x6 + 3x | C. f(x) = 3x3 + 2x4 – 2x2 | D. f(x) = x9 – 10x5 + 3x |

4. Determine whether or not each binomial is a factor of the polynomial: x3 + 6x2 – 13x – 42

|  |  |  |  |
| --- | --- | --- | --- |
| A. (x – 2) | B. (x + 2) | C. (x – 3) | D. (x + 3) |

5. Determine the roots/solutions of each equation, as well as their multiplicities.

|  |  |  |  |
| --- | --- | --- | --- |
| A. f(x) = 3x(x + 5)(2x – 1) | B. f(x) = 5(x – 2)(x – 2 ) | C. f(x) = x(x + 7)(x2 – 1) | D. f(x) = x3(x – 1)2(x + 8) |

6. Determine all possible rational roots for each equation.

|  |  |  |  |
| --- | --- | --- | --- |
| A. 2x3 – 3x2 + 4x – 6 = 0 | B. x4 – 2x2 + 4 = 0 | C. 3x3 – 27 = 0 | D. x4 – 3x2 + 2x + 8 = 0 |

7. Divide. Use synthetic division at least once, and long division at least once.

|  |  |  |
| --- | --- | --- |
| A. 5x3 + 2x2 – 8 ÷ (x + 5) | B. x3 – 5x2 + 7x – 3 ÷ (x – 3) | C. 4x4 – 8x3 + 12x – 1 ÷ (x – 2) |

8. Write a function in both factored AND standard form for each situation.

|  |  |  |
| --- | --- | --- |
| A. f(x) has roots -1, ¾ , 7, and 0 (M2.) | B. g(x) has roots 1 (multiplicity 2) & 3 | C. h(x) has roots 5*i* and -2 |
| D. k(x) has roots 4*i* and 2*i*  | E. m(x) has roots ½ and 9*i* | F. n(x) has roots -1 (M.2), 2/3, and 0 (M.3)  |

9. Solve each equation. State the multiplicity of each root that does not have a multiplicity of 1.

|  |  |  |
| --- | --- | --- |
| A. 4x4 = 9 | B. 2x3 – 7x2 – 4x = 0 | C. f(x) = 3x4 + x3 – 2x2 |
| D. f(x) = x4 + 11x2 + 18 | E. 2x4 + 5x2 = 12 | F. f(x) = x3 – 4x2 + x – 4 |
| G. f(x) = x4 – 21x2 – 100  | H. f(x) = x3 – x2 – 2x + 2 | I.  |
| J.  | K.  | L.  |

10. Describe the end behavior of each polynomial. (no calculator)

|  |  |  |  |
| --- | --- | --- | --- |
| A. f(x) = -3x9 + 2x3 - 7 | B. f(x) = –x12 + 5x3 – 9 | C. f(x) = x3 – 4x + 8 | D. f(x) = 3x4 – 3x3 + 3 |

11. Sketch a graph of each polynomial. (no calculator)

|  |  |
| --- | --- |
|  A. f(x) = 2x3 – 3x2 – 8x – 3 zeros: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *y*-int: \_\_\_\_\_\_\_\_\_\_\_\_ *x*-intercepts: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ End Behavior:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_plane.png | B. f(x) = x3 – 4x2 – 3x + 18zeros: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *y*-int: \_\_\_\_\_\_\_\_\_\_\_\_ *x*-intercepts: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ End Behavior:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_plane.png |

12. Consider a sixth degree polynomial, m(x). How many solutions are there for m(x) = 0? \_\_\_\_\_

a. Three of the roots of the polynomial are -3i, 9i, and $\sqrt{2}$. Write the equation for m(x) in factored form.

b. Another function, n(x), has -9i as a root. Do m(x) and n(x) share any roots? Explain.

13. Which of the polynomials below has a root of multiplicity two?

f(x) = 3x2 – 8 g(x) = 3x4 – 8x3 h(x) = 3x3 – 8x2

14. Which picture below illustrates a root of multiplicity two?

|  |  |  |
| --- | --- | --- |
| a. Macintosh HD:Users:boruch:Desktop:Screen shot 2016-06-07 at 8.36.42 PM.png | b. Macintosh HD:Users:boruch:Desktop:Screen shot 2016-06-07 at 8.37.11 PM.png | c. Macintosh HD:Users:boruch:Desktop:Screen shot 2016-06-07 at 8.36.21 PM.png |

15. 2x – 9 is a factor of a function w(x). What is the value of w(4.5)?

16. Use the remainder theorem to evaluate g(x) = x4 + 2x2 – 9 for g(-2).

17. A polynomial has roots at -4i, 7, and $\sqrt{3}$. Kayla claims that this polynomial must be at least quintic

(she is correct). Explain how Kayla knows the polynomial must be at least quintic.

18. Use synthetic division to determine each remainder.

a. 4p3 – 2p2 + 3p – 10 ÷ (x – 3) b. 13x2 + 2x3 – 9x + 1 ÷ (x + 2)

19. If x – 12 is a factor of P(x), then P(12) = \_\_\_\_\_.

20. State the possible rational roots. Then determine an actual root, and use that root to solve for all roots of the function: 

**Final Exam Review: Rational Functions**

1. Simplify each expression as much as possible. Also state the restrictions for each.

|  |  |  |
| --- | --- | --- |
| A. $\frac{63x}{126x^{2}}$ | B. $\frac{4n^{2}}{n+4}∙\frac{n^{2}+8n+16}{n^{2}-6n-40}$ | C. $\frac{1}{n-1}÷\frac{9}{n^{2}-9n+8}$ |
| D. $\frac{4p}{p^{2}+9p+20}-\frac{p-2}{p^{2}+8p+15}$ | E. $\frac{x^{2}+11x+30}{x^{2}-5x-50}$ | F. $\frac{1}{a-6}+\frac{4}{6a}$ |
| G. $\frac{m^{2}+12m+32}{m^{2}-4m-32}$ | H. $\frac{15m-15}{21m-21}÷\frac{m-1}{7}$ | I. $\frac{2x^{2}}{10x+80}∙\frac{x^{2}-64}{6x-48}$ |
| J. $\frac{6}{2n-5}+\frac{5n}{n+6}$ | K. $\frac{6}{x+1}-\frac{2x+1}{x^{2}-3x-4}$ | L. $\frac{10b-80}{100b-10b^{2}}∙\frac{b-10}{10b+70}$ |
| M. $\frac{5p}{3}-\frac{p-3}{2p^{2}-2p}$ | N. $\frac{n-1}{n^{2}+6n+5}-\frac{n-4}{n+5}$ | O. $\frac{30x^{2}-48x}{30x-48}÷\frac{6x}{7}$ |

2. Solve each equation. Also state the restrictions for each.

|  |  |  |
| --- | --- | --- |
| A. $\frac{x+6}{x^{2}}=\frac{1}{x^{2}}-\frac{5}{x}$ | B. $\frac{2}{k-2}+\frac{6k-24}{k-2}$ = 1 | C. $\frac{4x+24}{x^{2}-3x+2}=\frac{1}{x-2}+\frac{x+3}{x^{2}-3x+2}$ |
| D. $\frac{5r+20}{r^{2}+5r}=\frac{1}{r+5}+2$ | E. $\frac{x+2}{x^{2}+2x-8}-\frac{x-3}{x^{2}+7x+12}=\frac{3x}{x+3}$ | F. $\frac{x-9}{x^{2}-64}+\frac{2x-3}{x^{2}+5x-24}=\frac{8}{x-3}$ |

G. Describe in full sentences how the restrictions can affect the solutions to any rational equation.

In which part above did such a situation occur?