Math 1314 College Algebra **Fall 2018 Final Exam**
Class Time: **Name (Print):** _____

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1. Find the product $(5+3i)(2-i)$.

2. Solve the following equation by the indicated techniques
   (a) $3x^2+5x+2=0$

   (b) $x^2-6x+10=0$

(c) Find the Through (-1,2) and perpendicular to $y = 2x - 3$.

3. Word problems

   (a) A coffee manufacturer wants to market a new blend of coffee that sells for \$3.90 per pound by mixing two coffee that sells for \$2.75 and \$5 per pound, respectively. What amounts of each coffee should be blended to obtain the desire mixture of 100 pound?

   (b) Find the future value and interest earned if \$8000 is deposited for 9 years at 3% interest compounded quarterly. (Hint: use the formula $A = P(1 + \frac{R}{n})^{nT} and I = A - P$)

4. Solve

(a)

$$\frac{4}{x-2} - \frac{-3}{x+5} = \frac{7}{(x+5)(x-2)}$$

(b)

$$8 - 4(2 - x) \leq -2x$$

(c)

$$|3t - 2| \leq 4$$

5. (a) (4 points) Find the value of $f(-5), f(0), f(3)$ and graph the following piecewise function:

$$f(x) = \begin{cases} \frac{1}{x} & for \quad x < 0 \\ \sqrt[3]{x} & for \quad x \geq 0 \end{cases}$$

Graph the following function. Also give the domain and range

(b) $f(x) = -2(x+1)^4 + 1$

(c) $f(x) = -(x-5)^5 + 4$

(d)

$$f(x) = \frac{1}{x-4} + 5$$

(e)

$$f(x) = 3\sqrt[3]{x-4} + 3$$

(f)

$$f(x) = 2^{x-1} + 2$$

(g)

$$f(x) = \log_3(x-1) + 2$$

6. For the following function

$$f(x) = (x-5)^3(x+4)^2$$

find

(a) Find the real zeros and their multiplicity

(b) Determine where graph cross or touches (bounces back) at x-axis at the x-intercepts.

(c) Determine where graph cross or touches (bounces back) at x-axis at the x-intercepts.

(d) Find the number of maximum turning points

(e) Determine the end behavior

(f) Sketch the graph

7. Solve the system by using inverse matrix method.

$$\begin{aligned} x + 3y &= 5 \\ 2x - 3y &= -8 \end{aligned}$$

Note that

$$\begin{bmatrix} 1 & 3 \\ 2 & -3 \end{bmatrix}^{-1} = \begin{bmatrix} \frac{1}{3} & \frac{1}{3} \\ \frac{2}{9} & -\frac{1}{9} \end{bmatrix}$$

8. (a) Use the remainder theorem to find the remainder when $f(x) = x^3 - 5x^2 + 3x + 1$ is divided by $x - 1$.

   (b) Using the above information from 1 a) and factor theorem check that whether $x - 1$ is a factor of $f(x) = x^3 - 5x^2 + 3x + 1$ or not?

9. For the polynomial
$$f(x) = x^3 - x^2 - 10x - 8$$
   (a) Find all the potential rational zeros of $f(x)$.

   (b) By using the Descarte's Rule of sign how many positive and how many and how many negative solution $f(x)$ has.

10. (a) Find the end behavior of the following function

$$f(x) = 10x^6 - x^5 + 2x - 2$$

(b) For the following one-one function find the f^{-1} and Also give the **domain** of f^{-1}.

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

11. Find the zeros and their multiplicity of the following polynomial and sketch the graph

$$f(x) = x^2(x-5)(x+3)(x-1)$$

12. For the following function $f(x) = \frac{3x}{x^2-x-2}$ (Hint: factorize the denominator as (x-2)(x+1))
    (a) Domain

    (b) x-intercept

    (c) y-intercept

    (d) Vertical asymptotes

    (e) Horizontal or Oblique asymptotes

    (f) Sketch the graph

13. Solve the following

(a)

$$4^{x-2} = 2^{3x+3}$$

(b)

$$\log_2(x^3 + 65) = 0$$

(c)

$$\ln x + \ln x^2 = 3$$

14. solve

$$\log_2(2x - 3) + \log_2(x + 1) = 1$$

15. Solve the system of equation by matrix method

$$\begin{aligned} x + y &= 8 \\ x - y &= 4 \end{aligned}$$