Name: _____ _____ / **76**

Final Assessment Instructions:

- The Assessment is 19 problems and is worth 76 points.
- You will have 2 hours to complete the Assessment.
- The Assessment is closed book and closed notes.
- **Calculators are not allowed** on the Assessment.
- Show all your work for full credit and box your final answer.

1. [4 points] Simplify the following expressions:

a. $\left((3^{-1}x^{-1}y)(x^2y)^{-1}\right)^{-3} =$

b. $\dfrac{3}{\sqrt{6}-\sqrt{3}} =$

2. [4 points]

a. Multiply the polynomials, as indicated:
$(x+xy+y)(x-y) =$

b. Factor the polynomial by factoring out the greatest common factor:
$6xy^3+9y^3-12xy^4 =$

3. [4 points] Simplify the following expressions:

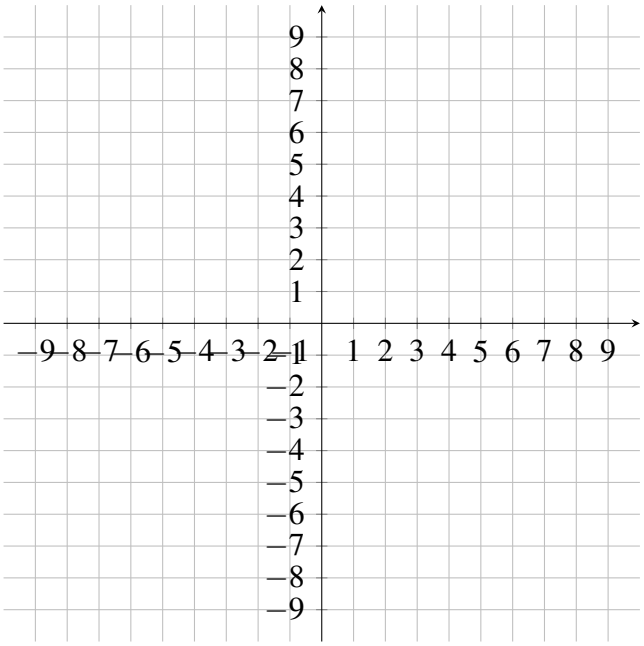
a. $i^{13} =$

b. $\dfrac{10}{3-i} =$

4. [4 points]

a. Solve the following absolute value equation:
$|4x+15| = 3$

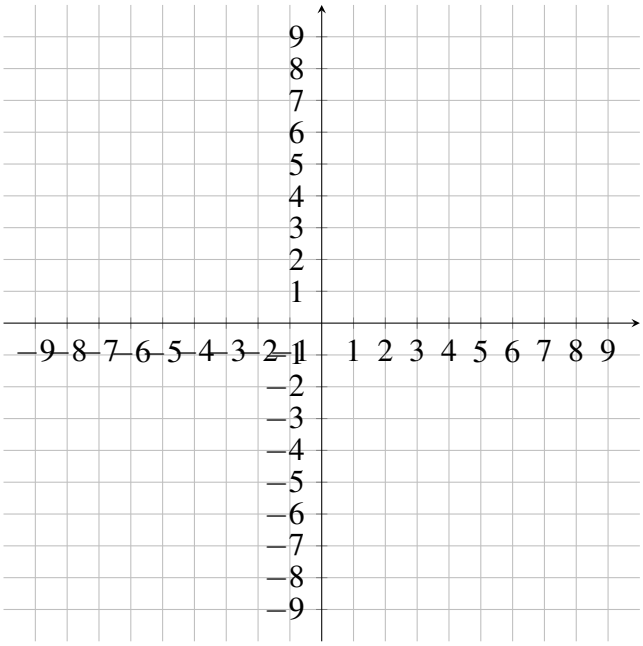
b. Solve the following absolute value inequality by graphing the solution set:
$|4-2x| > 11$



5. [4 points] Solve the following polynomial equation by factoring

$$a^3 - 3a^2 = a - 3$$

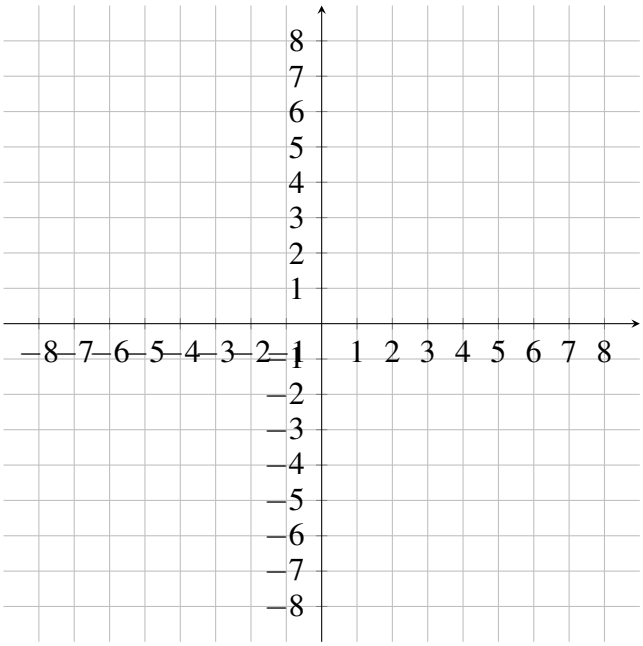
6. [4 points] Find the equation of the line that passes through the point $(5,0)$ and is perpendicular to the line $-5x+2y=1$. **Sketch** both lines on the plane below.



7. [4 points] Find the standard form for the equation of the circle

$$x^2 + y^2 - 4x + 8y - 16 = 0$$

Sketch the obtained circle on the plane below.

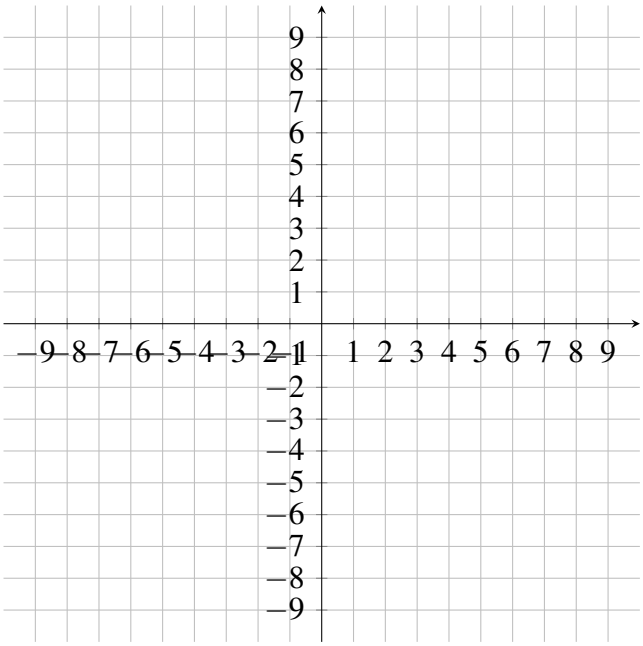


8. [4 points] Determine the implied domain of the following function

$$f(x) = \frac{5}{\sqrt{3-x^2}}$$

9. [4 points] Graph the following function with stating precisely **all** transformations.

$$g(x) = -\sqrt{x+5} - 2$$



10. [4 points] For the given function

$$h(x) = \frac{5}{x+3}$$

a. Determine $Dom(h)$

b. Evaluate $\dfrac{h(x-3)-h(x)}{x}$

11. [4 points] For the given function

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

a. determine if it has an inverse (Hint: sketch the graph of $f(x)$ and use a Horizontal Line Test).

b. if it has an inverse, then find a formula for it.

12. [4 points] Construct a polynomial function with the stated properties:

- second-degree
- zeros of -4 and 3
- and goes to $-\infty$ as $x \to -\infty$

13. [4 points] Find equations for the vertical asymptotes, if any, for the following rational function

$$f(x) = \frac{x^2+5}{(x+3)(x-4)(x^2-1)}$$

14. [4 points]

a. Solve the following exponential equation: $27^{y^2} = 3^{18y-27}$

b. Solve the following logarithmic equation: $\log_4(x-3) + \log_4 2 = 3$

15. [4 points] Use trigonometric identities and algebraic methods, as necessary, to solve the following trigonometric equations. Find the **complete solution set**.

a. $\sqrt{2} - 2\cos x = 0$

b. $\cos^2 x - 3 = -2\cos x$

16. [4 points] Solve for the remaining angle and sides of the triangle (**apply Law of Sines**):

$$A = 45^\circ, \quad B = 90^\circ, \quad a = 3$$

17. [4 points]

a. Find $\sin\theta$ if $\csc\theta = -7/5$

b. Determine the values of the **six** trigonometric functions of the given angle $\theta = \dfrac{\pi}{6}$.

18. [4 points] Sketch the graph of the following trigonometric function

$$f(x) = -3\sin\left(x + \frac{\pi}{2}\right)$$

State precisely the amplitude, frequency and the phase shift and **mark all** important points on the x- and y-axis.

19. [4 points]

a. Evaluate $\arccos\left(-\dfrac{\sqrt{3}}{2}\right) =$

b. Use trigonometric identities to simplify the expression
$\sin t(\csc t - \sin t) =$