Sample Exam 2

You are allowed to use a 3” x 5” note card, one side, and a scientific calculator. You must show work to support your answers. A correct answer without supporting work will not receive full credit. Simplify all your answers and indicate your answers clearly.

1. Determine if each of the following statements are true T or false F. Read the statements carefully! You do not have to show work here.

   (a) The inequality $|3x| < 2$ means $-2 < 3x < 2$ _________

   (b) The inequality $|x-8| > -5$ has no solution _________

   (c) The compound inequality $x > 5$ OR $x \leq -3$ has no solution _________

   (d) The endpoints of the graph $f(x) = -5x^4 - 6x^3 + 9x^2 + x + 1$ looks like follows _________

   (e) The end behavior of the graph $f(x) = x^5 + 3x^2 - x + 2$ looks like follows _________

   (f) The graph below could not be a polynomial function _________

   (g) In the Pythagorean theorem, $a^2 + b^2 = c^2$, $c$ always represent the hypotenuse of a right triangle. _________

   (h) $100x^2 + 9$ is prime _________

   (i) $(5x + 6)^2 = 25x^2 + 36$ _________
2. Solve the inequality. Other than $\emptyset$, graph the solution set on a number line.

$$1 - (x + 3) \geq 4 - 2x$$

3. For the following application problem, define a variable, set up an inequality and solve. Express your answer as a full sentence.

You are choosing between two long-distance telephone plans. Plan A has a monthly fee of $15 with a charge of $0.08 per minute for all long distance calls. Plan B has a monthly fee of $3 with a charge of $0.12 per minute for all long distance calls. How many minutes of long-distance calls in a month make plan A a better deal?

4. Solve the compound inequality. Express the solution set in interval notation.

$$-7 < 3 + 2x \leq 5$$
5. Solve the compound inequalities. Express the solution sets in interval notation.

(a) \( 5 - 3x \geq -13 \) AND \( 5x + 2 > -3 \)

(b) \( 5 - 3x \geq -13 \) OR \( 5x + 2 > -3 \)

6. Graph the system of inequalities in the coordinate system provided

\[
\begin{align*}
&x \leq 4 \\
&2y - x < 2
\end{align*}
\]

7. Find the solution set for the equation

\[3|2x - 3| - 8 = 25\]
8. Find the solution set for the equation

\[ |2x + 5| = -6 \]

9. Solve the inequality. Express your answer in interval notation.

\[ |x - 3| > 7 \]

10. Let \( f(x) = 4x^3y^2 - 7xy - 4 \) and \( g(x) = -x^3y^2 + 3x^3y - 4 \).

Find \( (f - g)(x) \)

11. Multiply

\( (4x^2 - 6xy + 9y^2)(2x + 3y) \)
For problems 12 to 15, factor completely

12. $9b^2x + 9b^2y - 16x - 16y$

13. $9x^2 - 42xy + 49y^2$

14. $40x^4 - 270x$

15. $6y^4 + 13y^2 + 6$
16. \( x^2 + 8x + 16 - 25a^2 \)

*Use factoring to solve the equation.*

17. \( x^3 - 4x^2 = 45x \)

*Determine the x-intercepts of the graph of the quadratic function*

18. \( f(x) = x^2 - 6x + 8 \)
19. Make a sketch and define your variable. Set up an equation and solve using factoring. Express your answer as a full sentence.

A tree is supported by a 13 foot rope that is bolted to the ground. The distance along the ground from the bottom of the tree to the end of the rope is two feet more than twice the height where the rope is attached to the tree. How far up the tree does the rope reach? (assume the ground on which the tree stands is level and that the tree grows straight up)

20. Make a sketch and define your variable. Set up an equation and solve using factoring. Express your answer as a full sentence.

A painting measuring 10 inches by 16 inches is surrounded by a frame of uniform width. If the combined area of the painting and frame is 280 square inches, determine the width of the frame.