MATH 5071 - Problem Set 9 - Exam 2 Review

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1) Solve the following inequalities. Report you answer with interval notation AND draw the solution set on a number line:

i) $1 < 1 - 2x < 7$

ii) $(x+1)(2x-3)(1-x) < 0$

2) Consider the following function: $f(x) = \sqrt{25 - x^2}$

i) Find the domain and range of $f(x)$

ii) Find $f\left(5\sqrt{5}\right)$

iii) Find x when $f(x) = 7$

3) Sonya invests \$3,000 into an account that has a 6% interest rate and is compounded monthly.

i) How much money will Sonya have after 10 years?

ii) How long will it take Sonya to double her investment?

4) Combine the following into one logarithmic expression:
$3\log(x) - \log(6) + 0.5\log(1-x) - 2\log(2x+1)$

5) Solve the following system of equations using any method that **doesn't** use a calculator. Check that your answer satisfies both equations.

$$\begin{cases} 3x - 4y = 4 \\ 9x + 2y = -3 \end{cases}$$

6) The half-life of Carbon-14 is 5730 years. And archeologist finds a bone containing 0.3 grams of Carbon-14. If the bone originally had 4 grams of Carbon-14, how old is this bone?

7) Solve by factoring: $2x^2 + 5x + 3 = 0$

8) Solve using the quadratic equation: $2x^2 + 5x + 10 = 0$

9) Solve for x: $x + 2 = \sqrt{x + 8}$

10) Solve by completing the square:

i) $x^2 - 10x + 16 = 0$

ii) $x^2 + 8x + 20 = 0$

11) The length a of the semi-major axis of a planet's elliptical orbit is directly related to the time T it takes for the planet to complete a revolution around the Sun. When T is measured in days and a in millions of kilometers, an equation modeling the situation is $\ln(T) = \frac{3}{2}\ln(a) - 1.72$. Solve this equation for a as a function of T.

12) Find the quadratic equation that contains the following 3 points **(NO CALCULATOR)**: $(0, 21)$, $(3, 33)$, $(-5, 121)$