

Name:

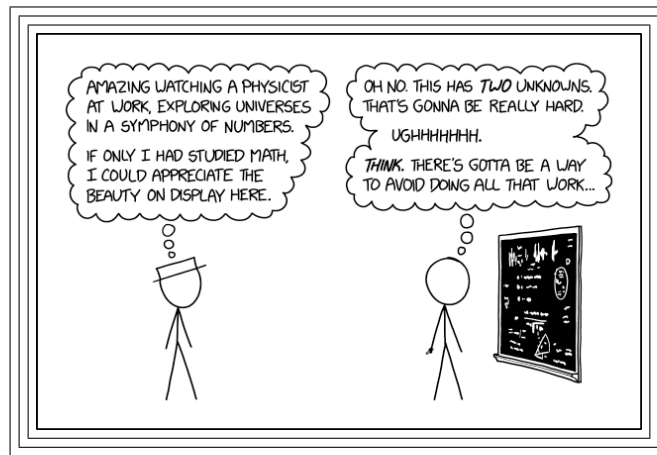
Algebra II
Examination 14 (Test)

DR. PAUL BAILEY
THURSDAY, MARCH 24, 2022

The examination contains ten problems which are worth 10 points each, and two bonus problems worth ten points each. All answers must be justified. An appropriate amount of work must be shown of receive credit.

The formula for the area A of a triangle with base b and height h is

$$A = \frac{1}{2}bh.$$

[illegible]

Problem 1. (Solving Logarithmic Equations)

Solve the equation

$$\log_x(17x - 60) = 2.$$

Correctly write the solution set.

Problem 2. (Solving Rational Equations)

Solve the equation

$$\frac{x^2 - 16}{x + 2} = 7.$$

Correctly write the solution set.

Problem 3. (Finding the Equation of a Line)

Let $A = (3, 8)$ and $B = (-5, 4)$. Find slope-intercept form of the equation of the line through A and B .

Problem 4. (Finding the Equation of a Circle)

Let $A = (3, 8)$ and $B = (-5, 4)$. Find the equation of a circle which has \overline{AB} as a diameter.

Problem 5. (Finding Inverses)

Let

$$f(x) = x^2 - 8x + 5.$$

Let g be an inverse function of f . Compute a formula for $g(x)$. State its domain and range.

Problem 6. (Finding the Domain)

Let

$$f(x) = \frac{\ln(x^2 - 25)}{x^2 - 9}.$$

Find the domain of f . Write your answer as the union of disjoint intervals.

Problem 7. (Factoring Cubics)

Let

$$f(x) = x^3 - 7x^2 + 8x + 10.$$

Notice that $f(5) = 0$. Use this to find the other two zeros of f . Write the solution set for the equation $f(x) = 0$.

Problem 8. (Set Operations)

Compute the following sets. Write your answer using correct set notation.

Let $A = [-5, 5]$, $B = (0, 10)$, and $C = \{p \in \mathbb{Z} \mid p \text{ is prime}\}$.

(a) $A \cup B$

(b) $A \cap B$

(c) $A \setminus B$

(d) $B \setminus A$

(e) $B \setminus C$

Problem 9. (Reference Angles)

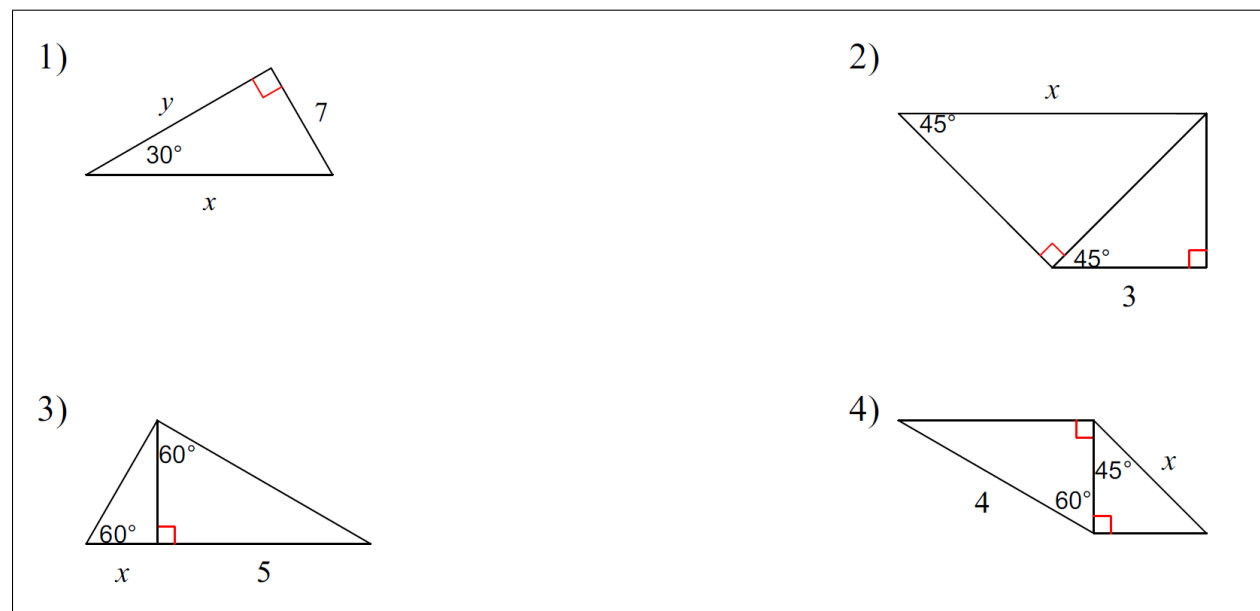
For each of the following angle measures, draw the angle with that measure in standard position, and state the reference angle.

(a) 150°

(b) -400°

Problem 10. (Standard Triangles)

Find x .



Problem 11. (Bonus - Lines and Circles)

A line through the origin of slope 3 is tangent to a circle centered at $(5, 0)$.

(a) Sketch this situation.

(b) Write the equation of the line.

(c) Find the point of tangency.

(d) Write equation of the circle.

Definition 1. Let $f : A \rightarrow B$, and let $D \subset B$. The *preimage* of B under f is

$$f^{-1}(D) = \{a \in A \mid f(a) \in D\}.$$

That is, the preimage of D is the set of all points in the domain which are mapped by f into D .

Problem 12. (Bonus - Preimage)

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be given by $f(\theta) = \sin(\theta)$, where θ is measured in radians. Find the preimage of $\{1\}$. Write your answer using correct set notation.