Assignment 3 Functions
Due Date: Tuesday, Feburary 1

1 Preamble

This assignment covers everything taught so far. The solutions that you hand in should be **neat** and **legible**, this is an assignment, not a quiz, so I expect you to take your time and present thorough and detailed solutions.

This assignment has **(REPLACE)** questions. **Start early**.

2 Replacement

If your mark on this assignment is better than the last assignment, then I will replace the old assignment with this one. This means that your final assignment mark will consist of two assignment marks, either A1, A3 or A1, A2.

3 Bonus

If you type this assignment in LaTeX, I will give you a bonus 7%.

4 Name and Date:

Print your name and todays date below;

Name	Date

Question 1. State in your own words, what does it mean for a number to be prime. What types of numbers can be primes? Why do we care about primes?

Question 2. Let $x \in \mathbb{Z}$ and let p be a prime.

(a) Determine all possible values of $\gcd(x, p)$.

(b) Determine all possible values of $\gcd(x^2, p)$.

(c) Determine all possible values of $\gcd(x, p^2)$.

(d) Determine all possible values of $\gcd(x^2, p^2)$.

(e) Determine all possible values of $\gcd(p^2, p)$.

Question 3. Let p be a prime number. Determine the value of $\text{rem}(p, 2)$ **and** explain how you got your answer.

Question 4. This question is meant for review as it will definitely appear on the Final. Let $f(x) = \sqrt{x}$, and let $R(x) = -2f(\frac{1}{2}x + 1) + 2$ be a transformation of f.

(a) Describe the transformation. **(Remember to Factor First)**

(b) Determine the expression for the coordinate transformation,

$$\left(\frac{x - H}{B}, Af(x) + K\right)$$

(c) Complete a coordinate table to determine the corresponding transformed coordinates using the following base coordinates,

$$(0, 0) \qquad (1, 1) \qquad (4, 2) \qquad (9, 3) \qquad (16, 4).$$

(d) Using your results from the coordinate table, sketch the transformation $R(x)$ **on your axis sheet**. Be sure to **label** the transformed coordinates as well as the function.

Question 5. Preform a prime factorization of the following natural numbers.
Note: If the number is a prime itself, then state that it is.

(a) 3634.

(b) 555.

(c) 663.

(d) 991.

Question 6. Fully simplify the following exponential expressions.
(Leave answers with positive exponents)

(a) $-x^2(-x)^2x^{-3}$

(b) $(x^{-4})/(y^2)^{-3}$.

(c) $(4^{-1}y^2z^{-3}x^8x^{-3})^{-3}y^{-6}z^9$.

(d) $(81a^3b^2z^{-6})^{-2}/(3a^9bz^{-4})^{-3}$.

(e) $(16)^{\frac{3}{2}}(9)^{\frac{3}{2}}(4)^{\frac{-5}{2}}$.

Question 7. Textbook, Pg. 39 Q1. a),c),e)

Question 8. Textbook, Pg. 39 Q3. a),c),e)

Question 9. Textbook, Pg. 39 Q4. a),c),e)

Question 10. Textbook, Pg. 39 Q5. a),c),e)

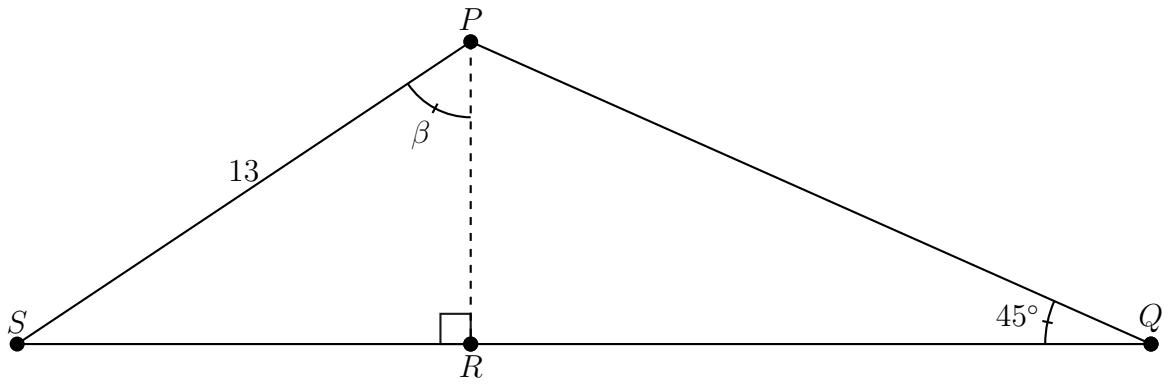
Question 11. Textbook, Pg. 39 Q7. a),c),e)

Question 12. Textbook, Pg. 94 Q4. a),c)

Question 13. Textbook, Pg. 94 Q6. c),d)

Question 14. Textbook, Pg. 94 Q6. b),c)

Question 15. You are given $\triangle SPQ$ where $SP = 13$, $\angle PQS = 45°$ and $\cos\beta = \sqrt{3}/2$. Determine the **exact** area of $\triangle SPQ$.



Question 16. Describe in your own words what polar coordinates are? Why are they useful and what advantages do they provide as a metric?

Question 17. Convert (a), (b) to polar coordinates and (c), (d) to standard coordinates.

(a) $\mathbf{P}(-3, 4)$. (b) $\mathbf{R}(-1, -3)$. (c) $\mathbf{Q}(4, 320°)$. (d) $\mathbf{T}(9, 30°)$.

Question 18. Determine the six trigonometric ratios for the following angles,

(a) $\theta_1 = 60°$ (b) $\theta_2 = 220°$ (c) $\theta_3 = -240°$ (d) $\theta_4 = 330°$