This exam contains 8 pages (including this cover page) and 7 problems. Check to see if any pages are missing. The exam is worth 100 points. The value of each question is listed below.

The following rules apply:

• You have **55 Minutes** to complete this exam.

• You may **not** use your books or notes on this exam.

• Please write clearly.

• You are required to show your work on Problems 1, 5, 6, and 7. No work is required for Problems 2, 3, or 4.

• **Partial Credit**: Incorrect answers with supporting work may receive partial credit. Problems 1, 5, 6, and 7 will receive no credit if there is no supporting work. Partial credit may not be awarded on some problems.

• Calculators are permitted with the exception of calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators (and their upgrades) are not permitted: TI-89, TI-92, TI-Nspire CX CAS, and HP-49. In addition, neither PDAs, laptops, nor cell phones are permitted.

• Unless otherwise specified, make sure your answers are in **exact form** (i.e. not a decimal approximation).

• Please write your answers in the boxes provided unless otherwise instructed.

• A random sample of graded exams will be copied before being returned.

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1. Solve the equations. Show all of your work. **Solutions by calculator will receive no credit.**

   (a) (8 points) $\sqrt{x} + \sqrt{x + 2} = 3$. Write your answer as a fraction. Separate multiple solutions with a comma.

   $$x =$$

   (b) (8 points) $\frac{2}{x - 2} - \frac{x + 1}{x + 4} = 0$. Write your answer as a fraction. Separate multiple solutions with a comma.

   $$x =$$

   (c) (6 points) Solve for $r$ in the equation $S = P(1 + r)^9$

   $$r =$$
2. Below is the graph of $y = f(x)$.

(a) (4 points) What is the domain of $f$? Give your answer in interval notation.

Domain =

(b) (4 points) What is the range of $f$? Give your answer in interval notation.

Range =

(c) (4 points) What is the $x$-intercept of $f$?

$x$-intercept =
3. Answer the following multiple choice questions. No need to show work. **Circle the correct answer**

(a) (5 points) Which of the following lines is parallel to the line $4x + 9y - 5 = 0$?

- (a) $y - 3 = \frac{4}{9} (x - 2)$
- (b) $y - 3 = -\frac{4}{9} (x - 2)$
- (c) $y + 3 = \frac{9}{4} (x - 4)$
- (d) $y - 1 = -\frac{9}{4} (x + 3)$
- (e) $y = 4/9$
- (f) None of the above

(b) (5 points) Which of the following lines is vertical and passes through the point (-2, 5)?

- (a) $y = -2$
- (b) $y = 5$
- (c) $x = -2$
- (d) $x = 5$
- (e) $y = \frac{5}{-2}$
- (f) None of the above

(c) (5 points) Find the domain of $f(t) = \frac{t}{\sqrt{2t - 3}}$.

- (a) All real numbers except 1.5
- (b) (0, 1.5)
- (c) $[1.5, \infty)$
- (d) All real numbers except 1.5 and 0
- (e) (1.5, $\infty$)
- (f) None of the above
4. Suppose \( f(x) = (1 - x)^3 \) and
\[
G(x) = \begin{cases} 
  x + 3 & \text{if } x > 1 \\
  4 - x^2 & \text{if } x \leq 1 
\end{cases}
\]

(a) (3 points) Determine \( G(-2) \).

(b) (3 points) Determine \( G(1) \).

(c) (4 points) Determine \( G(f(2)) \).

(d) (5 points) Determine \( (G \circ f)(2) \).
5. (10 points) Let \( f(x) = \frac{1}{2x - 3} \). Determine the expression for \( \frac{f(x + h) - f(x)}{h} \). You must simplify your result.

\[
\frac{f(x + h) - f(x)}{h} = \frac{1}{2x - 3} - \frac{1}{2x - 3} = \frac{1}{2x - 3}\]

6. (10 points) An electric utility company charges residential customers $0.15 per kilowatt-hour plus a base charge each month. One customer’s monthly bill comes to $55.72 for 320 kilowatt-hours. Find a linear function that describes the total monthly charges for electricity if \( x \) is the number of kilowatt-hours used in a month.

Monthly charges = \[
\text{Base charge} + (0.15 \times \text{KWH})
\]
7. To produce one bike tire, a company determines the cost for material to be $3.50 and the cost of labor to be $2.00. The fixed cost, regardless of sales volume, is $5000. The price the company charges is $8.50 per tire. Suppose the company produces and sells $q$ tires.

(a) (4 points) What is the total cost to produce $q$ tire?.

\[ \text{Cost} = \]

(b) (4 points) What is the revenue when selling $q$ tires?

\[ \text{Revenue} = \]

(c) (8 points) Determine the least number of tires that must be sold by the company to realize a profit.

\[ q = \]
Scrap work