INSTRUCTIONS: Outside paper and electronic devices are not permitted. Exam is worth 100 points. Neatness counts. Unless indicated, answers with no supporting work may receive no credit. BOX your final answers.

1. (12 points) Complete each of the following, be sure to show your reasoning:
   
   (a) Rationalize the denominator of $\sqrt{\frac{2}{x}}$

   (b) Multiply: $(\sqrt{x} + 2)(\sqrt{x} - 2)$

   (c) Write the statement in terms of inequalities: “The distance from $p$ to 3 is at most 5”

   (d) If you had 1 million dollars and you spent 1 thousand dollars each day, how long would it take to spend the one million dollars?

2. (15 points) Solve each of the following, show your reasoning:
   
   (a) Find the distance between points $A(0,8)$ and $B(6,16)$.

   (b) Find all real solutions to the equation: $|3x + 5| = 1$

   (c) Solve the inequality $\frac{1}{6} < \frac{2x-13}{12} \leq \frac{2}{3}$. Write your answer in interval notation.

3. (10 points) Solve and Simplify:
   
   (a) When finding a derivative in Calculus, one is required to simplify difference quotients. Simplify the following difference quotient from the derivative of $x^{-2}$: $\frac{1}{(x+h)^2} - \frac{1}{x^2} \frac{1}{h}$

   (b) Physics questions sometimes involve the equation $F = G\frac{mM}{r^2}$. In order to use this relationship it needs to be solved for $r$. Solve the equation for $r$, note $r$ is positive.

4. (6 points) Suppose an object is dropped from a height $h_0$ above the ground. Then its height after $t$ seconds is given by $h = -16t^2 + h_0$, where $h$ is measured in feet. If a ball is dropped from 64 ft above the ground, how long does it take to reach ground level?

5. (8 points) The post office will only accept packages for which the length, $L$, plus the distance around is no more than 108 inches. Thus, $L + 2(x + y) \leq 108$; for $x$ being the width, and $y$ being the height. What is the greatest acceptable length for a package that has a square end-cap measuring 9 in. by 9 in.?

MORE QUESTIONS ON THE BACK
6. (9 points) Identify the graph for each equation and name the relevant parts (slope and y-intercept for line, center and radius for a circle, vertex and max or min for a parabola):

(a) \(3x - 4y = 12\)
(b) \(x^2 + y^2 + 4x - 6y = 4\)
(c) \(x^2 - 4x + 2y = -14\)

7. (15 points) Sketch a graph of each of the following. Label at least one point on the graph.

(a) \(y = |x - 2| + 3\)
(b) \(y = \sqrt{-x}\)
(c) \(y = -\left(\frac{1}{x}\right)\)

8. (10 points) Consider the functions \(f(x) = x + 6\) and \(g(x) = x^2 - 7x + 12\)

(a) What is \((f \circ g)(-1)\)?
(b) Is \((g \circ f)(x)\) even or odd or neither?
(c) Solve \((f/g)(x) \leq 0\)

9. (15 points) True or False (Work need not be shown, i.e. no points for work shown)

(a) \(\frac{10}{11} < \frac{12}{13}\)
(b) \(1.1 \geq 1.\bar{1}\)
(c) \(8 \leq 8\)
(d) \((a \cdot b)^2 = a^2 \cdot b^2\)
(e) \((a + b)^2 = a^2 + b^2\)

(f) \(\sqrt{a + b} = \sqrt{a} + \sqrt{b}\)
(g) \(\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}\)
(h) \(\sqrt{a^2 \cdot b^2} = a \cdot b\)
(i) \(\sqrt{a^2 + b^2} = a + b\)
(j) \(\frac{1}{a} \cdot \frac{1}{b} = \frac{1}{a \cdot b}\)

(k) \(\frac{1}{a} + \frac{1}{b} = \frac{1}{a+b}\)
(l) \(\frac{a+b}{a} = b\)
(m) \(\frac{a \cdot b}{a} = b\)
(n) \(a^{-1} \cdot b^{-1} = (a \cdot b)^{-1}\)
(o) \(a^{-1} + b^{-1} = (a + b)^{-1}\)