NO CALCULATORS on these, unless you want to use them to CHECK your work. All answers should be **simplified**. If you did not receive at least 30 out of 35 points on your first attempt at Exam 1 Part 1, then you must submit this worksheet in order to retake the exam. **Show all your work.** Attach additional pages if you need more space on any problem. Remember that you may need to resubmit the worksheet before the deadline if you make too many mistakes, so either submit it early or get it right the first time!

Question 1

   (a) Find an equation for a line through the point $(-1, 4)$ that is perpendicular to the line $2x - 7y = 1$.

   (b) Sketch the graph of the equation $2x^2 + 2y^2 = 32$. Is it the graph of a function?

Question 2
Solve the following equation. (Hint: Start by factoring.)

$$(2x + 3)^{-2}(2)(x - 1) + (-2)(2x + 3)^{-3}(2)(x - 1)^2 = 0$$

Question 3

(a) Simplify:
$$\frac{e^{x+\ln x}}{x}$$

(b) Simplify:
$$\frac{\frac{1}{x} - \frac{1}{x+h}}{h}$$

(c) Solve for z: $\quad 3x^2y^2 + 2x^3yz = -2z$

Question 4

(a) If $f(x) = x^2 - 4$, evaluate and simplify $\frac{f(x+h)-f(x)}{h}$.

(b) If $F(x) = \sqrt{x^2 + 2}$ find a pair of functions $f(x)$ and $g(x)$ such that $F = f \circ g$.

Question 5

(a) Evaluate $\sec 3\pi/4$.

(b) Evaluate $\tan(-\pi/6)$.

(c) What is the domain of the function $f(x) = \cot x$?

(d) What is the range of the function $f(x) = \sin x$?

Question 6

(a) Find all values of x such that $\sin^2 x + \cos^2 x = \frac{1}{2} - \sin x$.

(b) Evaluate $\sin^{-1} 1$.

(c) Evaluate $\tan^{-1} \sqrt{3}$.

(d) Write $\tan(\sin^{-1} x)$ as an algebraic expression.

Question 7.

(a) Sketch the curve $y = 2 + \ln(x + 1)$. What is its domain? Is it an even function, an odd function, or neither?

(b) Sketch the graph of $f(x) = -|x - 1|$. What is its domain? Is it an even function, an odd function, or neither?

Question 8. Use properties of logarithms to write the following as the sum, difference, and/or multiple of logarithms.

$$\ln\left(\frac{x \tan^2 x}{\sqrt{x + 2}}\right)$$
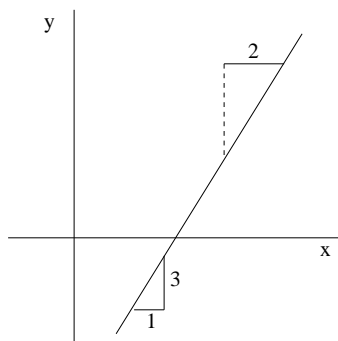
Question 9
Choose the graph that best matches the verbal statement: "Mary walked at a steady pace toward the tree." (Note: dist on the vertical axis stands for **distance from the tree**.)
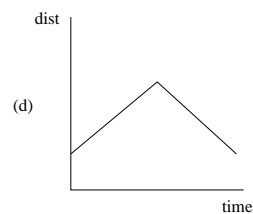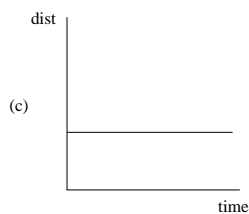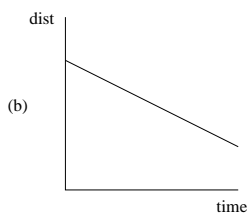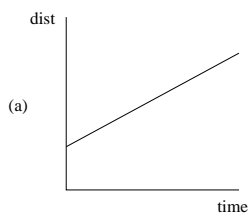
DEFEND your answer:

Question 10

Consider the following line with accompanying slope triangles. Only one of the statements relating to the graph is true. Choose the correct statement.


(a) The length of the dashed vertical line segment cannot be determined without more information.

(b) The length of the dashed vertical line segment is 3.

(c) The length of the dashed vertical line segment is 6.

(d) The length of the dashed vertical line segment is 9.

DEFEND your answer:

Question 11

The figure below has four dashed lines, each labeled with a letter. Circle the letter corresponding to the line segment with length $f(5)$.
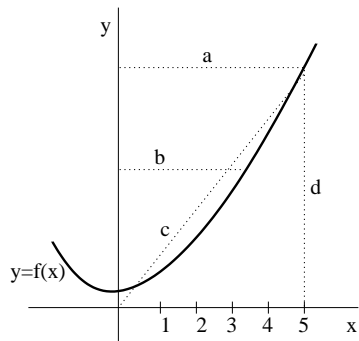
DEFEND your answer:

Question 12. Consider the polynomial $x^2 + 3x - 10$.

(a) Find the roots of the polynomial.

(b) Find the x-intercept(s) of $f(x) = x^2 + 3x - 10$.

(c) Find the y-intercept(s) of $f(x) = x^2 + 3x - 10$.

Question 13. Consider the function $f(x) = \begin{cases} -|x|, & x < 2 \\ x - 2, & x \geq 2 \end{cases}$

(a) Evaluate $f(-1)$.

(b) Evaluate $f(2)$.

(c) Evaluate $f(7)$.

(d) Evaluate $f\left(\frac{3}{2}\right)$.

(e) Sketch the graph of f over (at least) the interval $(-3, 3)$. Label any key points.