Exam 1 March 2, 2006 SHOW ALL WORK

Math 25 Calculus I Either circle your answers or place on answer line.

No Calculators Allowed

[14] 1.) Find the derivative of the following function: $f(x) = \sqrt{x + \sqrt{x}}$

Answer 1.) $f'(x) =$ ________________________________

[15] 2.) If $f(x) = \frac{4x^3+3e^x-10}{x-4} + \frac{1}{x}$, then $f'(2) =$ ________________________

[14] 3.) Find the equation(s) of the horizontial asymptote(s) of the following function. SHOW ALL STEPS.

$g(x) = \frac{x^2+4}{x^3+x}$

Answer 3.) ______________________________

[12] 4.) Find the following limit.

$$lim_{x\to 3}\frac{-2(x-2)^3(x-8)^4}{(x-3)^8(x-10)^5} = \_\_\_\_\_\_\_\_\_\_$$

[14] 5.) Let $f(x) = x^2 - 5$. Use the limit definition of derivative to find $f'(3)$.

What is the slope of the tangent line at $x = 3$? ______________

[12] 6.) Express the given quantity as a single logarithm (SIMPLIFY your answer):

$$ln5 - 2ln3 + 4ln2 - 3ln1 = \underline{\hspace{3cm}}$$

[9] 7.) If $g(x) = 3x - 4$, then $g^{-1}(x) =$ ________________________________.
Graph $y = g(x)$, $y = g^{-1}(x)$, $y = \frac{1}{g(x)}$

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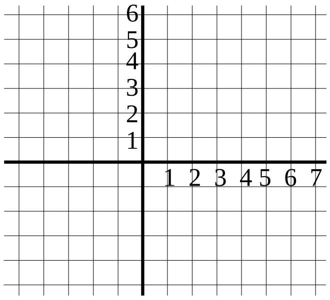

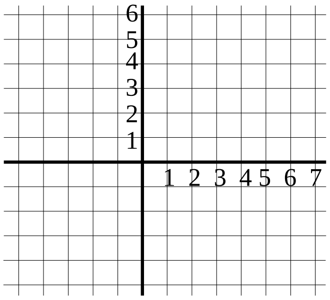

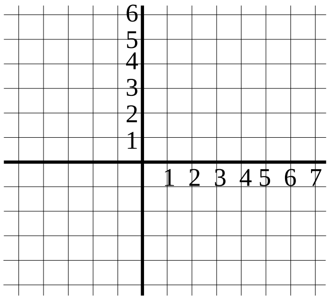

[10] 8.) Sketch the graph of an example of a function f that satisfies all of the given conditions:

Domain of $f = [-4, 6)$, range of $f = (-\infty, 5]$, not 1:1,
continuous everywhere except at $x = -2, 2$,
differentiable everywhere except at $x = -2, 2, 4$,
$lim_{x \to -2^-} f(x) = -\infty$, $lim_{x \to -2^+} f(x) = -\infty$, $lim_{x \to 3} f(x) = 4$
[3 pts extra credit if your function also satisfies $f'(1) = 0$, $f'(x) > 0$ for $x \in (1, 2)$, $f'(x) = 0$ for $x \in (0, 1)$]