MA 125-CT, CALCULUS I
Test 4, April 17, 2017

Name (Print last name first): .....

Show all your work and justify your answer!

No partial credit will be given for the answer only!

PART I

You must simplify your answer when possible.
All problems in Part I are 8 points each.

1. If $f(x) = x^2 e^{3x}$, find the derivative $f'(x)$.

2. Find the derivative of $f(x) = \ln(x^2 + 2)$.

3. Evaluate $\int e^{6x+1}\,dx$

4. Evaluate $\int \frac{1}{x\ln(x)}\,dx$

5. Solve $e^{2x-5} = 10$.

6. Solve $\ln(4x + 3) = 2$.

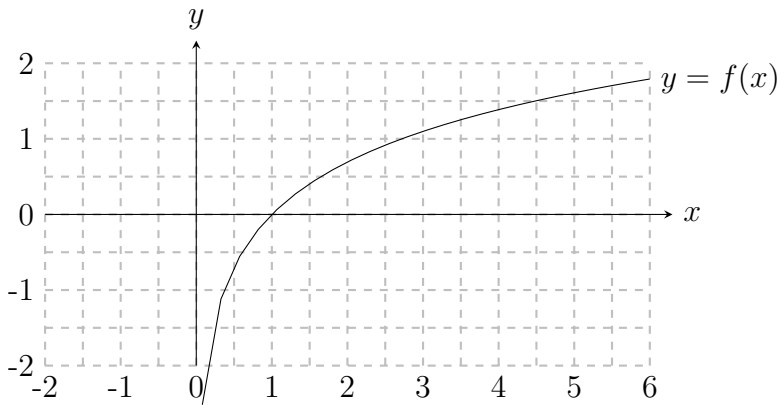
7. Use Newton's method to approximate the solution of the equation $\sin(x) - 0.55 = 0$ near $\pi/6$. Hint: choose $x_1 = \pi/6$ and find x_2. Give only the expression for x_2 and not its decimal value.

8. Given $f(x) = x^7 + x^5 + 2$ show first that $f(x)$ is one-to-one and then compute out $f^{-1}(2)$.

PART II

1. **[10 points]** Evaluate $\displaystyle\int_1^2 \frac{\ln x}{x}\,dx$. Show your work and do NOT give a decimal number as your answer (i.e., give an expression involving an appropriate function as your answer).

2. **[12 points]**Given the graph of $y = f(x)$ below **read off** the graph the following:
(1) the value of $y = f(4)$
(2) the value of $x = f^{-1}(0)$
(3) Estimate the derivative $f'(1)$. (Hint: draw the tangent line and estimate its slope).
(4) Estimate the derivative of $(f^{-1})'$ at 0. (Hint: draw the tangent line and estimate its slope). **Indicate in the graph how you found your values!**



3. **[14 points]**

   Find absolute minimum and absolute maximum of the function $f(x) = e^x(2-x)$ on the interval $[2, 3]$.

Scratch paper