

MAT 122 – 001
Spring 2008
Review for Comprehensive Exam

Show all work.

For limits, show the details of L'Hôpital's rule.

For differentiation problems, show the details of using the chain rule.

For integration problems, show substitutions and all details.

1. Find $\lim_{x \rightarrow 0} \frac{e^x - x - 1}{\cos x - 1}$.

2. Find $\lim_{x \rightarrow 1} (1 + \ln x)^{1/(x-1)}$.

3. $y = x^{\sqrt{x}} x^{\ln x}$. Find y' .

4. $\sin(e^{xy}) = x$. Find y' .

5. Integrate $\int x^2 \sin(x^3 + 1) dx$.

6. Integrate $\int_0^2 \frac{x+3}{(x^2+6x+1)^3} dx$.

7. Integrate $\int \frac{dx}{(4x-1)\ln(8x-2)}$.

8. Integrate $\int x e^{-4x^2} dx$.

9. Integrate $\int \frac{\cos x}{2\sin x + 3} dx$.

10. Set up a definite integral to find the area between the curves $y = x^3 - 2x^2 + 10$ and $y = 3x^2 + 4x - 10$. You need not do the integration.

11. Set up a definite integral to find the volume generated by revolving the region bounded by $y = x^2 + 2$, $x = 0$, and $y = 6$ about the y -axis. You need not do the integration.

12. Set up a definite integral to find the volume generated by revolving the region bounded by $y = \frac{1}{x^2}$, $x = 1$, $x = 4$, and $y = 0$ about the y -axis.