

NAME:

MATH 141 SECOND TEST - FOR PRACTICE

THIS IS A CLOSED BOOK, CLOSED NOTES TEST, USE OF CALCULATORS IS NOT ALLOWED. IF MORE SPACE NEEDED, LEAVE A MARK AND CONTINUE ON THE OTHER SIDE OF THE PAPER. SHOW DETAILS OF YOUR WORK.

1) Evaluate the following limits:

(a) $\lim_{x \rightarrow 0} \frac{\sin x - x}{\cos x - 1} =$

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(b) $\lim_{x \rightarrow 0^+} \sqrt{x} \ln x =$

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2) (a) Assume $\int_a^b f(x)dx = 2$ and $\int_C^b f(x)dx = 3$. What is $\int_a^c 2f(x)dx =$

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(b) Assume $\int_a^b f(x)dx = 2$ and $\int_b^a g(x)dx = 3$. What is $\int_a^b 2 + f(x) + g(x)dx =$

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3) Find an antiderivative for

a) $e^x + \cos x$

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b) $\left(\sqrt{t} + \frac{1}{\sqrt{t}}\right)^2$

5

c) $\frac{1}{x} + \frac{x}{x^2+1}$

5

4) Write out the Riemann sum for $\int_0^2 e^t dt$, using 4 subintervals of equal length, and using the midpoints of the subintervals for sample points.

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5) Which integral this Riemann sum may belong to? $\sum_{i=1}^n \ln\left(2 + \frac{4i}{n}\right) \cdot \frac{6}{n}$.

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6) $\frac{d}{dx} \int_x^{x^2} t^2 dt =$

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7) Evaluate the following definite integrals:

a) $\int_0^{\pi/2} \cos x dx$

b) $\int_e^{e^2} \frac{1}{x} dx$

c) $\int_{\ln 2}^{\ln 4} e^t dt$

d) $\int_0^1 (x^2 - x - 1) dx =$

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8) Compute the following integrals using substitution.

a) $\int x^3 \cos(x^4 + 2) dx =$

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b) $\int 2^x dx =$

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c) $\int_0^{\pi^2/4} \frac{\sin \sqrt{x}}{\sqrt{x}} dx =$

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BONUS PROBLEM Compute the integral $\int_0^2 x^3 dx$ using Riemann sums and computing their limit. (No credit for evaluation through the Fundamental Theorem.)