

DO NOT WRITE ABOVE THIS LINE!!

1. (10 points) Assume that $g(x)$ is an even function, and also that $\int_0^5 g(x) dx = 3$ and $\int_5^7 g(x) dx = 4$.

(a) Find $\int_0^{-5} g(x) dx$.

(b) Find $\int_{-5}^7 g(x) dx$.

(c) Find the average value of $g(x)$ on $[5, 7]$.

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2. (12 points) Calculate $\int \cos^4 x \sin^3 x \, dx$

3. (10 points) Set up, BUT DO NOT EVALUATE, an integral that represents the length along the curve $f(x) = \ln(3x)$ from $x = 1$ to $x = 5$.

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4. (12 points) Calculate $\int x \tan^{-1} x \, dx$. Note that $\tan^{-1} x$ is the inverse tangent function.

[Hint: $\frac{x^2}{1+x^2} = \frac{1+x^2-1}{1+x^2} = \frac{1+x^2}{1+x^2} - \frac{1}{1+x^2}$.]

5. (10 points) Calculate $\int \frac{\sin(\ln x)}{x} \, dx$.

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6. (14 points)

(a) Find the partial fraction decomposition of $\frac{1}{x^3 - x^2}$.

(b) Calculate $\int \frac{1}{x^3 - x^2} dx$

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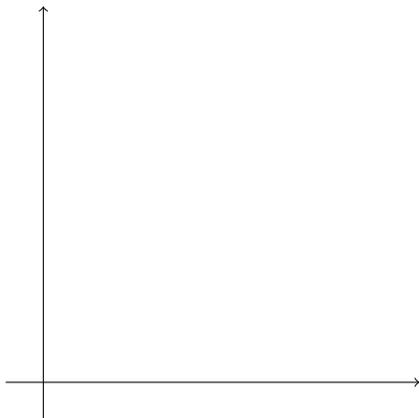
7. (10 points) Consider the (improper) integral $\int_2^4 \frac{dx}{(x-2)^2}$.

(a) Write the improper integral in terms of a limit.

(b) Evaluate the integral, or show that the integral does not exist. State if the integral is convergent or divergent.

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8. (10 points) Consider the region R in the first quadrant bounded by $y = \sqrt[4]{x}$ and $y = x$. On the axes provided, sketch a graph of the region R , labelling the axes as well. Then find the volume obtained by rotating R about the y -axis.



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9. (12 points) Calculate $\int_{-1}^{-\ln 2} 6te^{-t} dt$. Simplify your answer. Your answer should not have any e 's in it.