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1. (1 point)
Evaluate the integral

$$\int \frac{-6\sqrt{x}}{1+x^3}\,dx$$

Answer: ____________________ $+C$
Click for a hint

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2. (1 point)
Evaluate the indefinite integral

$$\int \frac{1}{4\cos x+3\sin x+1}\,dx$$

Answer: ____________________ $+C$

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3. (1 point)
Evaluate the indefinite integral

$$\int x^2\sin(4x+2)\,dx$$

Answer: ____________________ $+C$

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4. (1 point)
Evaluate the indefinite integral

$$\int x\tan^{-1}(3x)\,dx$$

Answer: ____________________ $+C$

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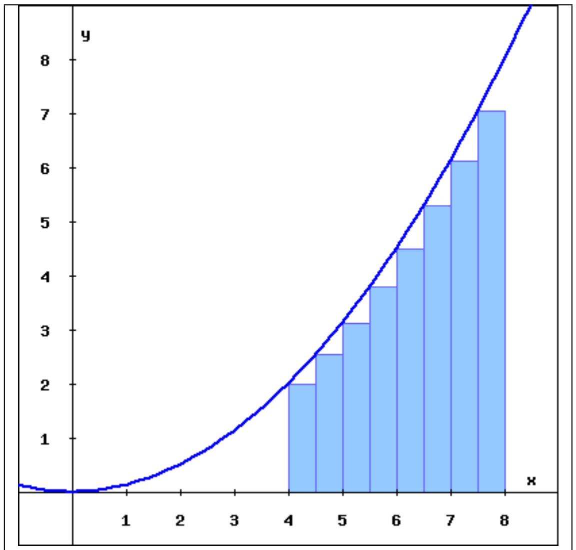
5. (1 point) a) The rectangles in the graph below illustrate a "left endpoint" Riemann sum for $f(x)=\frac{x^2}{8}$ on the interval $[4,8]$.
The value of this Riemann sum is ____________, and this Riemann sum is an $\boxed{?}$ the area of the region enclosed by $y=f(x)$, the x-axis, and the vertical lines x = 4 and x = 8.



Left endpoint Riemann sum for $y=\frac{x^2}{8}$ on $[4,8]$

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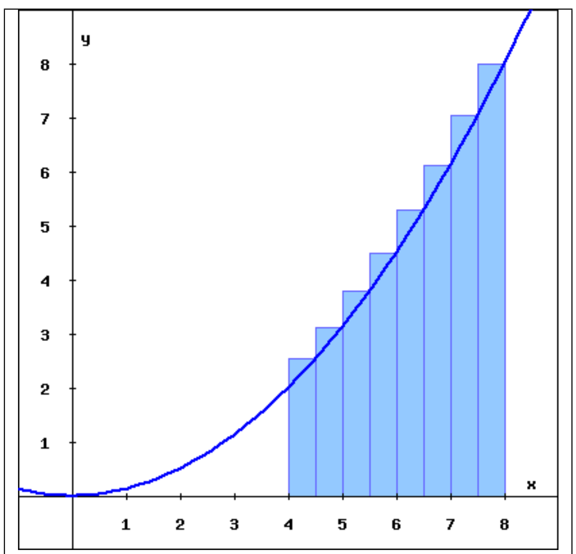
b) The rectangles in the graph below illustrate a "right endpoint" Riemann sum for $f(x)=\frac{x^2}{8}$ on the interval $[4,8]$.
The value of this Riemann sum is ____________, and this Riemann sum is an $\boxed{?}$ the area of the region enclosed by $y=f(x)$, the x-axis, and the vertical lines x = 4 and x = 8.



Right endpoint Riemann sum for $y=\frac{x^2}{8}$ on $[4,8]$

6. (1 point)
Evaluate the definite integral:

$$\int_{-1}^{6} |x-4x^2|\,dx = \_\_\_\_\_\_\_\_\_\_\_\_$$

7. (1 point)
Evaluate the following integral:

$$\int_1^2 \frac{-5\ln(x)}{x^2}\,dx$$

____

8. (1 point)
Evaluate the integral

$$\int_0^{\pi/2} \frac{9\cos t}{\sqrt{1+\sin^2(t)}}\,dt$$

____

9. (1 point)
Evaluate the integral

$$\int_{-1}^{2} (-1x-3|x|)\,dx$$

Integral = ____________

10. (1 point) Use the Fundamental Theorem of Calculus to find the derivative $\frac{dy}{dx}$, where:

$$y = \int_9^{\sqrt{x}} \frac{\cos t}{t^{13}}\,dt, \quad x > 0.$$

$\frac{dy}{dx}$ = ____________

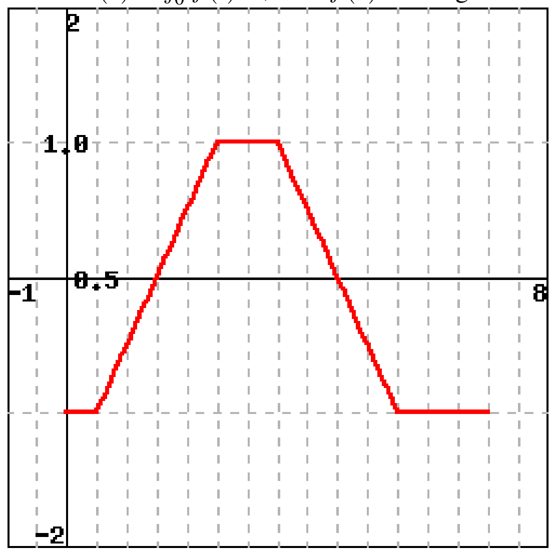
11. (1 point) Find a function f and a number a such that

$$2 + \int_a^x \frac{f(t)}{t^2}\,dt = 3x^{-3}$$

$f(x) =$ ____________
$a =$ ____________

12. (1 point)

Let $A(x) = \int_0^x f(t)\,dt$, with $f(x)$ as in figure.



$A(x)$ has a local minimum on $(0,7)$ at $x =$ ____________

$A(x)$ has a local maximum on $(0,7)$ at $x =$ ____________

13. (1 point)
Let $I_n = \int_0^{\frac{\pi}{2}} \sin^n x\,dx$, for $n \geq 0$.
It is known that the following reduction formula holds for some constants A and B:

$$I_n = \frac{n+A}{n+B} I_{n-2} \qquad \text{for } n \geq 2.$$

Find the values of A and B.
A = ____________
B = ____________
Click for a hint
Hence, evaluate I_{10}.
I_{10} = ____________

14. (1 point) Determine whether the integral is divergent or convergent. If it is convergent, evaluate it. If not, enter *div*

$$\int_4^{+\infty} xe^{-3x}\,dx$$

Answer: ____________

15. (1 point) Evaluate the improper integral.

$$\int_2^4 \frac{dx}{\sqrt{4x-x^2}}$$

____

Hint: Use the technique of completing the square.

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