Practice Final 2

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1.	Compute the fourth	h Riemann Sur	for f(x) = 0	$e^x + \arctan(x) + 2$	2 from x = -	1 to $x = 1$.	Use right	endpoints a	as your
samp	le points.								

2. Let f(x) be continuous and $\int_0^{16} f(x) dx = 6$. Find $\int_0^4 x f(x^2) dx$.

3. Compute $\int_{-2}^{3} (x^2 - 4x + 3) dx$ by evaluating the limit of its Riemann sums.

4. Suppose a particle moves back and forth along a straight line with velocity v(t), measured in feet per second, and acceleration a(t). What are the meanings of $\int_0^{60} v(t) dt$, $\int_0^{60} |v(t)| dt$ and $\int_0^{60} a(t) dt$?

5. (a) Simplify $\frac{d}{dx} \left[\int_{x^2}^{10} (\arctan(t) - 4) dt \right]$

(b) Given h(2) = 1, h(5) = 8, h'(2) = 2, h'(5) = 7. Evaluate $\int_2^5 x h''(x) dx$.

6. (a) Find the most general antiderivative of $x^2 - 4x + 3$.

(b) Evaluate $\int_{-1}^{3} (x^2 - 4x + 3) dx$

7. Suppose g(-2) = 3, g(2) = 9 and $\int_{36}^{108} f(z) dz = 15$. Evaluate $\int_{-2}^{2} 4f(12g(x)) g'(x) dx$.

8. Evaluate the integral $\int_0^1 \frac{1}{(5x+2)^{30}} dx$. Show all work.

9. Evaluate the integral $\int \tan(\frac{x}{2}) dx$. Show all work.

10. Evaluate the integral $\int_e^{e^2} \ln(x) dx$. Show all work.

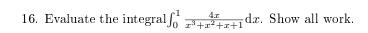
11. Evaluate the integral $\int \arctan(3x) dx$. Show all work.

12. Evaluate the integral $\int_{-1}^{3} \frac{x^3}{\sqrt{36-x^2}} dx$. Show all work.

13. Evaluate the integral $\int \sqrt{4x^2 + 25} dx$. Show all work.

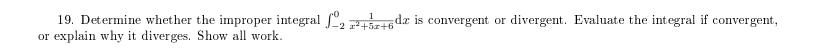
14. Evaluate the integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \tan^2(x) dx$. Show all work.

15. Evaluate the integral $\int \sin^2(x) \cos^4(x) dx$. Show all work.

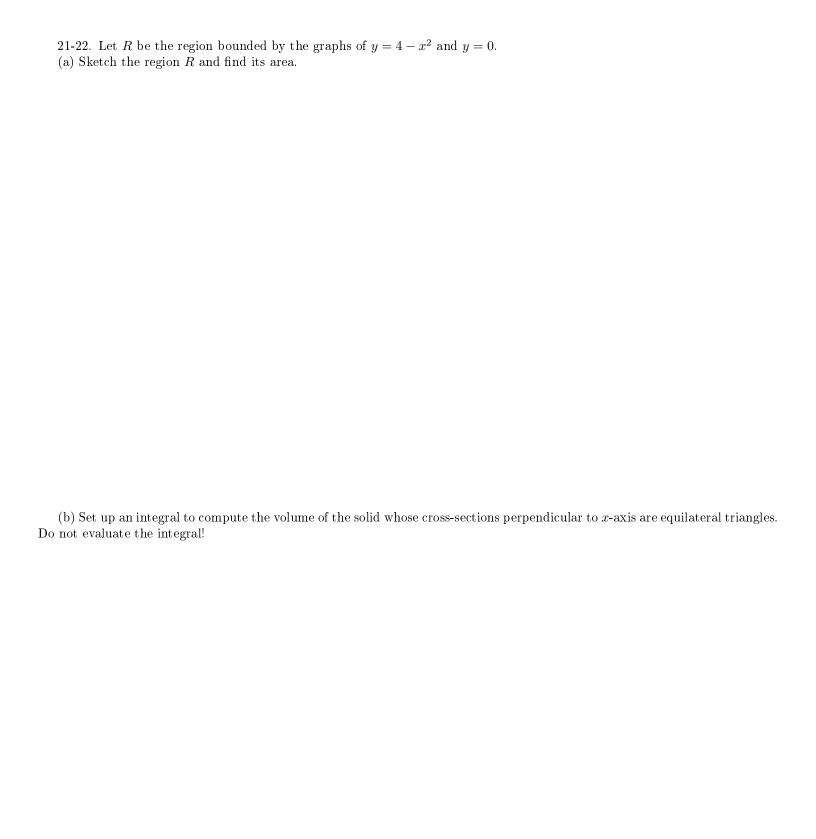


17. Evaluate the integral
$$\int \frac{6x^2+8x+3}{x^3+x} dx$$
. Show all work.

18. Determine whether the improper integral $\int_0^\infty \cos(x) dx$ is convergent or divergent. Evaluate the integral if convergent, or explain why it diverges. Show all work.



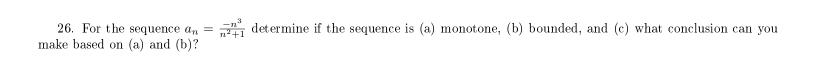
20. A particle moves along a line with velocity function $v(t) = t^3 - 7t^2 + 10t$, where v is measured in meters per second. Find (a) the displacement and (b) the distance traveled by the particle during the time interval [0,3].



23.	Find the exact	length of	the curve $u =$: 2 ln ($\sin \frac{1}{2}x$) for	$r = \frac{\pi}{2} < x < \pi$.

24. Find the average of the function $f(x) = x^{-2}e^{\frac{1}{x}}$ over the interval [1, 3]. Show all work.

25. Using integration find the area of the triangle with vertices A=(-2,7), B=(13,4), C=(4,-5) and sides AB: x+5y=33, BC: x-y=9, CA: 2x+y=3.



27. Use the Squeeze Theorem to show that the sequence $b_n = \frac{(-1)^{n+1}}{n^2}$ converges.

28. Determine the general term formula for the sequence $\{2, -3, \frac{9}{2}, -\frac{27}{4}, \frac{81}{8} \dots\}$. Use the formula to find the 50^{th} term.

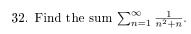
29-31. For each of the following sequences $\{b_n\}_{n=1}^{\infty}$, compute the $\lim_{n\to\infty}b_n$. If a limit doesn't exist, expain why not. Show all work.

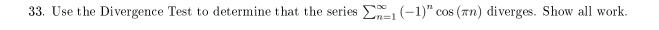
(a) $b_n=e^{-n}\cdot n$

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(b)
$$b_n = \cos\left(\frac{\pi n}{4}\right)$$

(c)
$$b_n = \frac{1}{n}$$





34. Use the Alternating Series Test to determine whether the series
$$\sum_{n=1}^{\infty} \frac{n \cos(\pi n)}{n^5+1}$$
 is convergent or divergent. Show all work.

35. Use the Direct or Limit Comparison Test to determine whether the series $\sum_{n=1}^{\infty} \frac{n^2-1}{n^3-n-2}$ is convergent or divergent. Show all work.

36. Use the Ratio or Root Test to determine whether the following series is convergent or divergent. Show all work. (a) $\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2}$

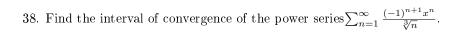
(a)
$$\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2}$$

(b)
$$\sum_{n=1}^{\infty} \frac{2^n (-1)^n}{n^n}$$

37. Use any Convergence Test to determine whether the following series is convergent or divergent. Show all work. (a) $\sum_{n=3}^{\infty} \frac{1}{n \ln n}$

(b) $\sum_{n=2}^{\infty} \frac{\ln n}{n^3 - 5}$

(c) $\sum_{n=1}^{\infty} \frac{n!}{2^n}$



39. Find the first three nonzero terms of the Taylor series expansion of
$$f(x) = \sin^2(x)$$
 about $x = \pi$.

40. Find the Maclaurin series for
$$f(x) = x \cos(x)$$
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