

TEST #3

NAME:

Pledge: I pledge on my honor that I have neither given nor received any assistance on this exam nor have I used any dishonest means to obtain my results.

Signature: _____

Note: This test is out of 60 points. To receive full credit you must **SHOW ALL WORK!**

Some Formulae You May Find Useful:

$$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$$

$$\sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

$$\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

$$\sin^2(x) = \frac{1}{2} - \frac{1}{2} \cos(2x)$$

$$\cos^2(x) = \frac{1}{2} + \frac{1}{2} \cos(2x)$$

Question	Score Possible	Score
1	30	
2	8	
3	10	
4	12	

Total Score: _____ / 60

1. (5 points each) For each of the following integrals, tell me what technique you need to use to solve the integral. **Your choices are: u -substitution, integration by parts, trig identity, trig substitution, or partial fractions.**

- If it is a u -substitution, state u and du and the changed integral in terms of u .
- If it is an integration by parts, state u , v , du , and dv , and write the integration by parts formula out.
- If it is a trig identity, state which one you would use and why.
- If it is a trig substitution, state the trig substitution you would use and give the new integral in terms of θ .
- If it is an integration by partial fractions, state the form that the partial fraction decomposition would take (but do not compute the constants).

IN NO CASE DO YOU NEED TO COMPUTE THE VALUE OF THE FINAL INTEGRAL.

Finally, some of these integrals may require a second technique after you complete the first one. If so, state what the second technique would be, but do not attempt to execute it.

(a) $\int \frac{2x^2 - x + 4}{x^3 + 4x} dx$

(b) $\int x^2 \sqrt{25 - x^2} dx$

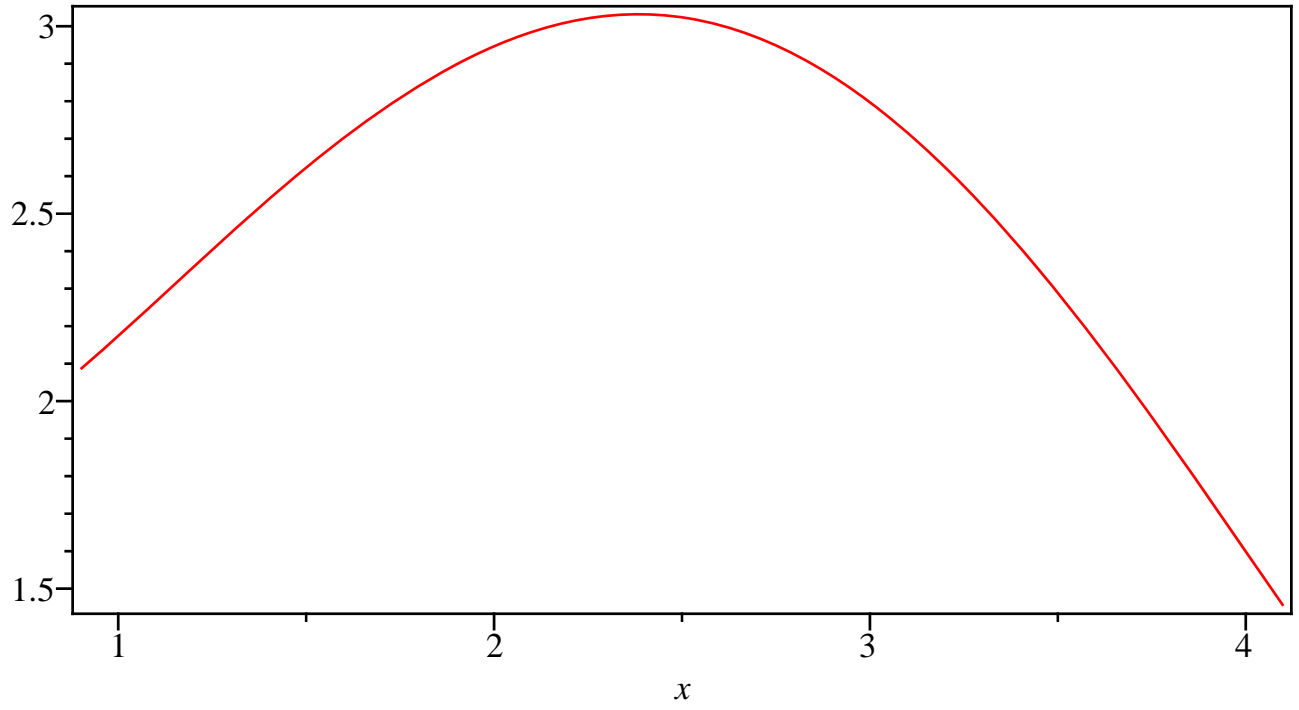
$$(c) \int \cos^3 x \sin^2 x \, dx$$

$$(d) \int \frac{dx}{x\sqrt{1 - [\ln(x)]^2}}$$

$$(e) \int \theta^3 \sec^2(\theta^2) d\theta$$

(f) $\int \sin^{-1}(x) dx$

2. (8 points) Find the value of the integral or determine that it diverges: $\int_0^2 \frac{\ln(x)}{\sqrt{x}} dx$.



3. Consider the attached plot of a function $f(x)$.

(a) (5 points) Use the trapezoid Rule to estimate the value of $\int_1^4 f(x)dx$ with 6 subintervals. Will your answer be too large or too small and why?

(b) (5 points) Use Simpson's Rule to estimate the value of $\int_1^4 f(x)dx$ with 6 subintervals. Will your answer be more or less accurate than your answer from (a) and why?

4. Consider the sequence $a_n = 3\left(-\frac{2}{5}\right)^n$, for $n = 0, 1, 2, \dots$

(a) (3 points) Write out the first 5 terms of a_n .

(b) (5 points) What type of sequence is (a_n) ? Does it converge or diverge? If it converges, find the limit.

(c) (4 points) Consider the series $\sum_{n=0}^{\infty} a_n$. Does this series converge or diverge? If it converges, find the limit.