

TEST #1

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 65 points. To receive full credit you must **SHOW ALL WORK!**

Some Formulae You May find useful:

$$\sum_{i=1}^n i = \frac{n(n+1)}{2}$$

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sin\left(\frac{\pi}{4}\right) = \sin\left(\frac{3\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right) = -\cos\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

Question	Score Possible	Score
1	15	
2	5	
3	10	
4	10	
5	17	
6	8	

Total Score: _____ / 65

1. Compute the following: (5 points each)

(a)

$$\int_1^2 \frac{x^3 - \sqrt[4]{x}}{x} dx$$

(b)

$$\int \frac{\sin\left(\frac{\pi}{x}\right)}{x^2} dx$$

(c) The average value of the function $f(x) = \frac{2x}{(1+x^2)^2}$ over the interval $[0, 2]$.

2. (5 points) If the velocity of a particle is given by $v(t) = \sec^2(t)$, and the position of the particle at $t = \frac{\pi}{4}$ is known to be $x(\frac{\pi}{4}) = 3$, then find the position of the particle $x(t)$ as a function of time for all values of t .

3. Consider the function

$$F(x) = \int_{\pi}^x \frac{t+1}{t^2+3} dx$$

- (a) (5pts) Find the values of x for which F has a maximum or minimum.

- (b) (5 pts) Find the points of inflection of F .

4. (10 points) Consider the function $f(x) = x^2$. Use the **definition** of the definite integral to find the area under f from $x = 1$ to $x = 3$.

5. (a) (5 pts) Find the area between the functions $x = 2y^2$ and $y = -\frac{1}{2}x + 2$.

(b) (7 points) Find the volume generated by rotating the area in part (a) around the y -axis.

- (c) (5 points) Set up but do not evaluate an integral that equals the volume generated by rotating the area in part (a) around the line $y = 1$.

6. Consider the function $f(x) = x + \sin(x)$.

a) (5 pts) Using $n = 4$, give an approximation of the net area under f from 0 to π .

b) (3 pts) Is your answer too small or too large? Justify your response.