NAME (please print legibly): 
Your University ID Number: 
Circle your Instructor’s Name along with the Lecture Time:

Yoonbok Lee (MWF 9:00)  Dillon Ethier (MWF 12:00)  
Carl Mueller (MWF 1:00)  Eyvindur Palsson (TR 2:00)

• No calculators are allowed on this exam.

• Please show all your work. You may use back pages if necessary. You may not receive full credit for a correct answer if there is no work shown.

• Please put your simplified final answers in the spaces provided.

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1. (8 points)
Find
\[ \frac{d}{dx} \int_{1}^{x^3} \cos t \, dt \]

ANSWER: _______________________

2. (48 points) Evaluate the following integrals.

(a) (8 points)
\[ \int_{0}^{1} \left( 3\sqrt{x} - \frac{2}{1 + x^2} \right) \, dx. \]

ANSWER: _______________________

2
(b) (8 points)

\[ \int \frac{\sin \theta}{\cos^2 \theta} \, d\theta. \]

\text{ANSWER: } \underline{\hspace{5cm}}

(c) (8 points)

\[ \int x^3(5 - x^2) \, dx. \]

\text{ANSWER: } \underline{\hspace{5cm}}
(d) (8 points)

\[ \int \frac{1}{x^2 \sqrt{1 + \frac{1}{x}}} \, dx. \]

**ANSWER:**

(e) (8 points)

\[ \int_0^2 2e^{x/2} \, dx. \]

**ANSWER:**
(f) (8 points)

\[ \int_{-1}^{1} |x^2 - x| \, dx. \]

ANSWER: 5
3. **(16 points)** An object is moving in such a way that its velocity function at time $t$ is given by $v(t) = \sin(t)$.

(a) (8 points) Find the displacement from $t = 0$ to $t = 2\pi$.

(b) (8 points) Find the total distance traveled from $t = 0$ to $t = 2\pi$.

ANSWER: ________________________________
4. (12 points)

Find the area of the region bounded by the curves $x = y^2$ and $x = 4y$.

ANSWER: 7
5. (16 points) Consider the region enclosed by the three curves $y = x^2$, $x = 2$ and $y = 0$.

(a) (8 points) Set up a definite integral that represents the volume of the solid obtained by rotating this region about $y = 7$. Do NOT evaluate the integral.

Answer: 

(b) (8 points) Set up a definite integral that represents the volume of the solid obtained by rotating this region about $x = -1$. Do NOT evaluate the integral.

Answer: 