

University of Nevada, Reno — MATH182 (Calculus 2)
Midterm 1 Test (50 points) — Spring 2019 — Version 2

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Name: _____

Solutions

To receive full credit for a problem you must show all necessary work.

1. (8 points) Find the derivative of the function: $f(x) = \int_1^{x^3-2} \cos(2t) dt$.

Suppose $F'(t) = \cos 2t$

So $f(x) = F(x^3-2) - F(1)$ by fundamental theorem.

So $f'(x) = F'(x^3-2) \cdot 3x^2 - 0$
 $= \cos 2(x^3-2) \cdot 3x^2$

2. (8 points) Find $\int_e^{\infty} \frac{1}{x(\ln x)^2} dx$.

~~step~~ See Question 3 in Version 1

3. (8 points) Compute the indefinite integral $\int \frac{e^x}{\sqrt{e^x-3}} dx$

$$\text{Let } u = e^x - 3$$

$$du = e^x dx$$

$$dx = \frac{1}{e^x} du$$

$$\int \frac{e^x}{\sqrt{e^x-3}} dx = \int \frac{e^x}{\sqrt{u}} \cdot \frac{1}{e^x} du$$

$$= \int u^{-\frac{1}{2}} du$$

$$= \frac{u^{\frac{1}{2}}}{\frac{1}{2}} + C$$

$$= 2(e^x-3)^{\frac{1}{2}} + C$$

$$\text{or } = 2\sqrt{e^x-3} + C$$

4. (7 points) Find $\lim_{n \rightarrow \infty} \cos\left(\frac{n}{\sqrt{3n^3+1}}\right)$.

$$\lim_{n \rightarrow \infty} \cos\left(\frac{n}{\sqrt{3n^3+1}}\right)$$

$$= \lim_{n \rightarrow \infty} \cos\left(\frac{1}{\sqrt{3n+\frac{1}{n^2}}}\right)$$

$$= \cos\left(\lim_{n \rightarrow \infty} \frac{1}{\sqrt{3n+\frac{1}{n^2}}}\right)$$

$$= \cos 0$$

$$= 1$$

5. (7 points) Sketch the region enclosed by the parabola $y = 2x^2$ and the line $y = 3 - x^2$, and find the area.

See Version | Question 5

6. (7 points) The region R is enclosed by the curves $y = 2x - x^2$ and $y = 0$. Use cylindrical shells, find the volume of the solid obtained by rotating R about the y -axis.

See Version | Question 7

7. (7 points). Let R be the region bounded by $y = x^2$ and $y = 2x$. Find the volume of the solid obtained by rotating R about the x -axis.

See Version 1 Question 6
