

*no calculators or smart phones anywhere!
*show all relevant work to receive full credit
*any evidence of academic dishonesty = 0 grade
*only pencils, pens = - 5 from grade
*late for exam= - 5 from grade

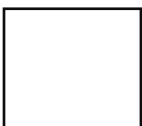
If needed $\sin 2u = 2 \sin u \cos u$

1. Find the indefinite integral:

$$\int \frac{1}{x^2 \sqrt{x^2 - 4}} dx$$

2. Find the indefinite integral:

$$\int \frac{x^2}{\sqrt{4 - x^2}} dx$$



3. Find the partial fraction decomposition: $\frac{x^2 - 3x - 2}{x^2(x - 2)}$

4. Find the partial fraction decomposition: $\frac{4x^2 - 3x + 3}{(x - 1)(x^2 + 1)}$

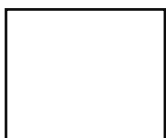


5. Find the limit, if it exists.

$$\lim_{x \rightarrow 0} \left(\frac{e^{2x} - \cos x - 2x}{x^2} \right)$$

6. Find the limit, if it exists.

$$\lim_{x \rightarrow 0^+} (x \ln x)$$



7. Determine if the improper integral converges or diverges. If convergent find its value.

$$\int_1^2 \frac{1}{\sqrt{4-x^2}} dx$$

8. Determine if the improper integral converges or diverges. If convergent, find its value.

$$\int_0^{\infty} \frac{e^{-x}}{1+e^{-x}} dx$$



Bonus. If finite, find the volume of the solid generated by rotating the region bounded by the graphs of $y = e^{-2x}$, and the x -axis for $x \geq 0$ about the x -axis. If the volume is not finite, support your conclusion.

