

Sample Exam #4

Math 150–Hughes

You may use a scientific calculator. Show all work.

1. Find the general indefinite integral.

a) $\int \frac{3x^4 + 4\sqrt{x} + 5}{x} dx$

b) $\int \sec 4x \tan 4x dx$

c) $\int \frac{\sin x}{\cos^3 x} dx$

d) $\int \frac{e^{1/x}}{x^2} dx$

2. Evaluate the definite integral.

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

b) $\int_0^3 \frac{x}{\sqrt{x+1}} dx$

3. Let $F(x) = \int_{-1}^{\sqrt{x}} \frac{t^3}{(1+t^2)^2} dt$ for $x \geq 0$.

a) Find $F(1)$.

b) Find $F'(x)$.

4. An object moves along a line so that its velocity at time t (in seconds) is $v(t) = t^2 - 2$ (in meters per second). Find the total distance traveled by the particle during the time period $0 \leq t \leq 2$ (seconds).

5. Find the area of the region enclosed between the curves $y = 2x$ and $y = x^3 - 2x$.

6. Consider the region in the first quadrant bounded by $y = x^2$, $y = x + 2$, and $x = 0$.
- Set up, but do not evaluate, an integral for the volume of the solid obtained by revolving the region about the y -axis.
 - Set up, but do not evaluate, an integral for the volume of the solid obtained by revolving the region about the line $y = 4$.
7. Use a Riemann sum using left endpoints and $n = 4$ to approximate the definite integral $\int_0^2 (5 - 2x) dx$. Use the area interpretation to find the exact value of the integral.