

Name: _____ Pseudonym: _____

Please show all work and box the answers, where appropriate.

1. (10 pts.) Differentiate the following functions:

(a) $\cosh(\ln(x^2 + 1))$ (b) $\arctan(e^x)$ (c) $\log_2(x^3 + 1)$ (d) 2^{x^3+1} (e) $x^{\sin x}$

2. (10 pts.) Evaluate the following expressions:

(a) $\int 2^{2x} dx$ (b) $\int \frac{\cos\sqrt{x}}{\sqrt{x}} dx$ (c) $\int \frac{dt}{t((\ln t)^2 + 1)}$

(d) $\int \cos^3(x) dx$ (e) $\frac{d}{dx} \int_0^{e^x} (\arctan t)^2 dt$

3. (10 pts.) Evaluate the following integrals:

(a) $\int x(2x + 1)^{1/3} dx$ (b) $\int \frac{dx}{\sqrt{16 + 6x - x^2}}$

4. (10 pts.) Sketch the following functions:

(a) $y = 2^x$ (b) $y = \left(\frac{1}{2}\right)^x$

5. (10 pts.) Evaluate the following limits:

(a) $\lim_{x \rightarrow 0} \ln(\arcsin x + 1)$ (b) $\lim_{x \rightarrow 0^+} \ln(\arcsin x)$

6. (10 pts.) Let
- R
- be the region in the plane bounded by the
- x
- axis and
- $y = \sin(x)$
- ,
- $0 \leq x \leq \pi$
- . Find the volume of the solid formed by rotating
- R
- around the
- x
- axis. Sketch.

7. (10 pts.) Find the length of the curve given by
- $y = x^{\frac{3}{2}}$
- ,
- $0 \leq x \leq 1$
- .

8. (10 pts.) Find the surface area generated by rotating the curve
- $x = \cos t$
- ,
- $y = \sin t$
- ,
- $0 \leq t \leq \pi$
- around the
- x
- axis.

9. (10 pts.) Find the centroid of the region between the curves
- $y = x^2$
- and
- $y = 2 - x$
- . Sketch.

1	2	3	4	5	6	7	8	9	total (90)	%