

07/11/2013

Midterm2

Name: Student ID: **Instructions.**

1. **You must show all your work.** You get zero point if you just state the answer without showing necessary intermediate steps. No formula sheet or calculator is allowed during the actual exam.

Signature: Date:

Question	Points	Your Score
Q1	10	
Q2	10	
Q3	10	
Q4	10	
Q5	10	
Q6	10	
TOTAL	60	

[Q1] [10 points]

(a) State the domain, range, x intercept and y intercept of $y = e^x$.

State the domain, range, x intercept and y intercept of $y = \ln x$.

(b) Sketch the graphs of $y = e^x$ and $y = \ln x$.

(c) Find the value of x if $\ln(x - 1) + \ln(x + 1) = 2$.

[Q2] [10 points] Find $\frac{dy}{dx}$ using any technique you want.

1. $y(x) = e^{\tan(2x)}$

2. $y(x) = \ln(\sin x) - \frac{1}{2} \sin^2 x$

3. $y(x) = \frac{(x^2 + 1)^4}{(2x + 1)^3(3x - 1)^5}$

4. $x \arcsin y = y - 1$

[Q3] [10 points] Compute the following indefinite and definite integrals.

1. $\int e^{-2x} dx$

2. $\int x \cos x dx$

3. $\int_1^{e^3} \frac{4}{x} dx$

4. $\int \frac{x+2}{2x+3} dx$

5. $\int_{-2}^1 (2t-1)^{100} dt$

[Q4][10 points] An object is moving along a straight line and its position function is $y = 3t^2 - 5t - 2$, where t is measured in seconds and y is measured in centimeters.

- (a) Find the velocity function. What are its units?
- (b) Find the acceleration function. What are its units?
- (c) When does the object reach the origin? What is its velocity at that moment?

[**Q5**] [10 points] (a) Sketch the graph of $f(x) = -(x - 5)(x + 3)$.

(b) Compute the area under the curve $f(x) = -(x - 5)(x + 3)$ on the interval $[-3, 5]$. What is the average value of $f(x)$ on this interval?

- [Q6] [10 points]** (a) Find an equation of the tangent to the curve $y = (2 + x)e^{-x}$ at the point $(0, 2)$.
(b) Find all points on $y = (2 + x)e^{-x}$ where the tangent lines are horizontal (that is, where $y'(x) = 0$).