

MATH 2250 - Royal
PRACTICE Exam # 2
Form A

Name _____

Important things:

- Remember, you must show your work to receive credit. Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- You don't have to work through the test in order. Go in the order you want to.
- You are allowed to use a TI-30XS Multiview Calculator. No other calculators are permitted, and sharing of calculators is not permitted.
- I hope you do a great job!

Problem	Score	Out of
1		22
2		12
3		10
4		10
5		12
6		12
7		22
Total		100

I will be academically honest in all my academic work and will not tolerate academic dishonesty of others.

Signed: _____ Date: _____

1. Differentiate the following functions.

(a) (6 points) $f(x) = \frac{e^{3x} \sin(x)}{x^2 - 3x}$

(b) (8 points) $f(x) = (x^2 + 3)^5 \ln(7x + 1)$

(c) (8 points) $y = 3^{x^2+5} + \arctan(7x)$

2. Use the information below to determine the following.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	4	-7	8	19
3	-4	2	5	23
5	6	-1	7	40

(a) (6 points) If $y = f(x) \cdot g(x)$, determine $y'(1)$.

(b) (6 points) If $y = f(g(x))$, determine $y'(3)$.

3. (10 points) Determine $\frac{dy}{dx}$ for the function $y = \frac{\sqrt[3]{8x+7}(x+2)^{2/3}(4x-1)}{x^5(3x-1)^{12}}$.

4. The position of a particle at time $t > 0$ (in seconds) is given by the equation $s(t) = t^3 - 12t^2 + 45t$, where s is in feet.

(a) (6 points) When is the particle moving in the positive direction? In the negative direction?

(b) (4 points) What is the velocity at the instant when the acceleration is zero?

5. (12 points) Use the definition of the derivative to determine the derivative of $\cos(x)$.
Make a note of any “important facts” that you use from class.

Important Facts:

Using the definition of the derivative to determine $\frac{d}{dx}(\cos(x))$:

6. (12 points) Use implicit differentiation and differentiation of exponential functions to determine the derivative of $y = \log_a(x)$. In other words, use implicit differentiation and differentiation of exponential functions to explain why the differentiation rule is correct.

(22 points) A coffee filter in the shape of an inverted cone contains coffee. The cone is 4 in tall and its radius is 3 in. Coffee drips through a hole in the tip of the cone at a constant rate of 2 cubic inches per minute. How fast is the coffee level falling when the depth of the coffee is 1.5 inches?

Extra space for work. If you want me to read/grade the work on this page you should write me a note on the corresponding question's page.