

Your Name: \_\_\_\_\_

Your Instructor's Name: \_\_\_\_\_

SATELLITE  
EXAM

Problem Number	Points Possible	Points Earned
1	12	
2	12	
3	12	
4	12	
5	12	
Total	60	

- **JUSTIFY YOUR ANSWERS:** Answers without supporting work will not receive full credit.
- **SIMPLIFICATION:** It is not necessary to simplify your answers.

**JUSTIFY YOUR ANSWER!!!**  
**-- ANSWERS WITH LITTLE OR NO SUPPORTING WORK --**  
**WILL RECEIVE LITTLE OR NO CREDIT**

**Problem 1.** Find  $\frac{dy}{dx}$  for each of the following:

(a)  $y = \frac{7 + x + x^3}{\sqrt{x}}$

(b)  $y = \sin(\cos^2(x))$

(c)  $xy^2 - x = y$

**JUSTIFY YOUR ANSWER!!!**  
**-- ANSWERS WITH LITTLE OR NO SUPPORTING WORK --**  
**WILL RECEIVE LITTLE OR NO CREDIT**

Problem 2. Find the following limits:

(a)  $\lim_{x \rightarrow 0^+} \frac{x^2 + 1}{x^2 + x}$

(b)  $\lim_{x \rightarrow -2} \frac{x + 2}{x^2 - 3x - 10}$

(c)  $\lim_{x \rightarrow 2} \frac{3x^3 - 2x + 1}{x^3 - 2}$

**JUSTIFY YOUR ANSWER!!!**  
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**Problem 3.** Find a value of  $b$  which makes  $f$  continuous:

$$f(x) = \begin{cases} x + b, & \text{if } x < 1; \\ x^2 + 2 & \text{if } x \geq 1. \end{cases}$$

**JUSTIFY YOUR ANSWER!!!**  
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**Problem 4.** The height of an elevator is given by  $s(t)$  for  $t \geq 0$ , where  $t$  is time measured in minutes,  $s$  is measured in feet and

$$\frac{ds}{dt} = (t - 2)(t - 4)(t - 47).$$

- (a) When is the elevator rising?
- (b) When is the elevator falling?
- (c) When is the elevator at rest?
- (d) What is the total distance traveled by the elevator between times  $t = 0$  and  $t = 4$  given in terms of  $s(0), s(1), s(2), s(3)$  and  $s(4)$ ?

**JUSTIFY YOUR ANSWER!!!**  
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**Problem 5.** A spherical balloon is inflating in such a way that its surface area is increasing at a rate of  $1 \text{ cm}^2/\text{minute}$ . Find the rate at which the diameter is increasing when the diameter is 5 centimeters (be sure to include the units in your answer).

Some spherical formulæ:

Volume	Surface Area	Diameter
$V = \frac{4}{3}\pi r^3$	$S = 4\pi r^2$	$d = 2r$

NOT  
COVERED.  
(SECT 2.B)