

MATH 141

MIDTERM EXAM I

October 4, 2000

NAME (please print legibly): _____

Your University ID Number: _____

Circle your Instructor's Name along with the Lecture Time:

Felea (2 o'clock) Knightly (9 o'clock) Kojcinovic (10 o'clock) Voloshina (2 o'clock)

- No calculators are allowed on this exam.
- Please show all your work. You may use back pages if necessary. You may not receive full credit for a correct answer if there is no work shown.
- Please put your simplified final answers in the spaces provided.

QUESTION	VALUE	SCORE
1	10	
2	10	
3	5	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	15	
TOTAL	100	

1. (10 pts) Find x such that:

(a) $\left| \frac{x+5}{-3} \right| \geq 6$

ANSWER: _____

(b) $|10x - 4| = 9$

ANSWER: _____

2. (10 pts) Given $P(-1, 2)$ and $Q(3, 5)$, find the following.

(a) The distance $|PQ|$.

ANSWER: _____

(b) The slope of the line through P and Q .

ANSWER: _____

(c) The line through P parallel to the x -axis.

ANSWER: _____

(d) The line through Q perpendicular to the line $2x + 6y + 3 = 0$.

ANSWER: _____

3. (5 pts) Do the following.

(a) Convert the angle of $\frac{-8\pi}{5}$ radians to degrees.

ANSWER: _____

(b) Convert the angle of 150 degrees to radians.

ANSWER: _____

4. (10 pts) Find the exact values.

(a) $\sin\left(\frac{4\pi}{8}\right) \tan\left(\frac{-\pi}{3}\right)$

ANSWER: _____

(b) $\cos^2\left(\arctan\left(\frac{1}{8}\right)\right) + \sin^2\left(\arctan\left(\frac{1}{8}\right)\right)$

ANSWER: _____

(c) $2 \sin\left(\frac{\pi}{12}\right) \cos\left(\frac{\pi}{12}\right)$

ANSWER: _____

(d) $\arccos\left(\cos\left(\frac{\pi}{9}\right)\right)$

ANSWER: _____

5. (10 pts) Find functions whose graphs are obtained from the graph of $f(x) = x^3 + 1$ by:

(a) Shifting 6 units to the right.

ANSWER: _____

(b) Vertically stretching by a factor of 10.

ANSWER: _____

(c) Reflecting about the y -axis and then shifting 4 units up.

ANSWER: _____

6. (10 pts) Do the following.

(a) Let $f(x) = \ln x$ and $g(x) = x^2 - 9$. Find $f \circ g$ and $g \circ f$.

ANSWER: _____

(b) Find f and g such that $f \circ g = \tan(\sqrt[3]{x})$

ANSWER: _____

7. (10 pts) Find the inverse function for $f(x) = \frac{x+1}{2x+5}$.

ANSWER: _____

8. (10 pts) Solve equations given below.

(a) $5^x + 5^{x+1} = 10$

ANSWER: _____

(b) $\ln(x^2) - 9 = \ln x$

ANSWER: _____

9. (10 pts) A ladybug is crawling on the y -axis. If her position at time t is given by $y = 2t^2 + 1$, find her average velocity between $t = 1$ and $t = 3$ seconds.

ANSWER: _____

10. (15 pts) Evaluate each of the following limits.

(a) $\lim_{x \rightarrow 3} \frac{x^2 + 1}{(x + 2)(x + 6)}$

ANSWER: _____

(b) $\lim_{x \rightarrow 4} \frac{4 - x}{2 - \sqrt{x}}$

ANSWER: _____

(c) $\lim_{x \rightarrow 0} |x| \cos\left(\frac{\pi}{x}\right)$

ANSWER: _____

(d) $\lim_{x \rightarrow 5^-} \frac{4}{x - 5}$

ANSWER: _____

(e) $\lim_{x \rightarrow 7} \frac{\frac{1}{x} - \frac{1}{7}}{x - 7}$

ANSWER: _____