

Name _____
date _____ Sept 2010

MATH 1090 TEST 1

instructor:
50 minutes with calculator

Work problems completely, either on this paper, or on another sheet, which you include with this paper.
Credit will be given for work. Circling correct answer without work to support the answer will not receive credit.
If you turn in work on another paper, number the problems so they can be found and read.
If you answer "none of the preceding," tell what the answer should be.

1. Perform the indicated operations and simplify: $\frac{x}{x^2+5x+6} + \frac{2}{x^2-4} - \frac{3}{x^2+3x+2}$

a) $\frac{x^2 - 12x + 24}{(x+2)(x-2)(x+3)}$

b) $\frac{x^3 - 2x^2 + 3x + 24}{(x+1)(x+2)(x-2)(x+3)}$

c) $\frac{x^2 + 5x - 6}{(x+1)(x+2)(x+3)}$

d) $\frac{x^3 - 2x^2 + 9x + 12}{(x+1)(x+2)(x-2)(x+3)}$

e) $\frac{x^2 - 7x - 12}{(x+1)(x+2)(x+3)}$

f) none of the preceding

2. Rationalize the denominator and simplify: $\frac{q}{\sqrt{q}-1}$

a) $\frac{q(\sqrt{q}-1)}{q+1}$

b) $\frac{q(\sqrt{q}-1)}{q-1}$

c) $\frac{q(\sqrt{q}+1)}{q+1}$

d) $\frac{q(\sqrt{q}+1)}{q-1}$

e) $\frac{q(\sqrt{q}-1)}{q^2-1}$

f) none of the preceding

3. Find the equation of the line through $(-3, 4)$ and parallel to the x -axis.

a) $y = 4$

b) $x = -3$

c) $-3x = 4y$

d) $x = 4$

e) $y = -3$

f) none of the preceding

4. The estimated monthly profit realizable by the Cannon Precision Instruments Corporation for manufacturing and selling x units of its model M1 cameras is $P(x) = -0.04x^2 + 240x - 10,000$ dollars. Determine the number of cameras Cannon should produce each month in order to maximize its profits.

a) 5958

b) 3000

c) 350,000

d) 6042

e) 6000

f) none of the preceding

5. Find the values of x that satisfy the inequality $(x + 3)(x - 5) \leq 0$.

a) $(-3, 5)$

b) $[-5, 3]$

c) $[-3, 5]$

d) $(-\infty, -5] \cap [3, \infty)$

e) $(-\infty, -3] \cup [5, \infty)$

f) none of the preceding

6. Factor completely: $x^3 + 3x^2 - 2x - 6$

a) $(x + 1)(x - 2)(x + 3)$

b) $(x^2 + 2)(x - 3)$

c) $(x + 1)(x + 2)(x - 3)$

d) $(x^2 - 2)(x + 3)$

e) $(x - 1)(x + 2)(x + 3)$

f) none of the preceding

7. Find the rule for the composite function $g \circ f$ when $f(x) = \sqrt{x} + 1$ and $g(x) = x^2 - 1$.

a) $(\sqrt{x} + 1)^2 - 1$

b) $\sqrt{x^2 - 1} + 1$

c) x

d) 1

e) $x + 2\sqrt{x}$

f) none of the preceding

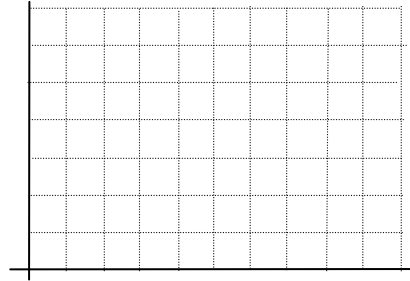
8. Solve $\frac{2x-1}{3x+2} = \frac{2x+1}{3x+1}$.

9. Find the domain of the function $f(x) = \frac{\sqrt{1-x}}{x^2-4}$

10. Simplify $\frac{u^{-1} - v^{-1}}{v - u}$; write your answer using positive exponents only.

11. According to a study, the out-of-pocket costs to senior citizens for health care, $f(x)$ (as a percentage of income), in year t where $t = 0$ corresponds to 1977, is given by

$$f(x) = \begin{cases} \frac{2}{7}t + 12 & \text{if } 0 \leq t \leq 7 \\ t + 7 & \text{if } 7 < t \leq 10 \\ \frac{1}{3}t + \frac{41}{3} & \text{if } 10 < t \leq 25 \end{cases}$$



- a. Sketch the graph of f .
- b. What was the out-of-pocket cost, as a percentage of income, to senior citizens for health care in 1982?
- c. What was the out-of-pocket cost, as a percentage of income, to senior citizens for health care in 1992?
12. The management of TMI finds that the monthly fixed costs attributable to the production of their 100-watt light bulbs is \$12,1000.00. The cost of producing each twin-pack of light bulbs is \$0.60 and each twin-pack sells for \$1.15.
- a. Find the company's cost function.
- b. Find the company's revenue function.
- c. Find the company's profit function.

Answers — Math 1090, Test 1, FALL 2010

(10 points each, Score = $\frac{\text{points}}{120}$)

1. sect'n 1.4, #35, **B**

2. sect'n 1.7, #65, **D**

3. sect'n 2.2, #37, **A**

4. sect'n 2.6, #37, **B**

5. sect'n 1.9, #21, **C**

6. sect'n 1.3, #51, **D**

7. sect'n 2.4, #27, **E**

8. sect'n 1.6, #30, $\frac{-3}{8}$

9. sect'n 2.3, #35, $(-\infty, -2) \cup (-2, 1]$

½ credit for A

10. sect'n 1.5, #51, $\frac{1}{uv}$

11. sect'n 2.7, #23, a. →

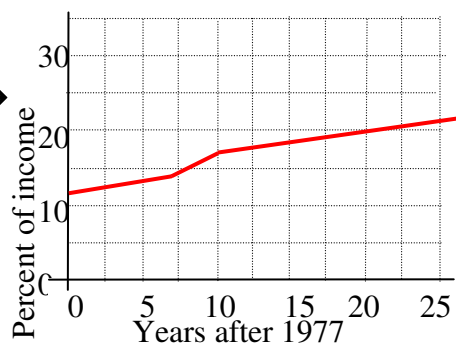
b. 13.4% c. 18.7%
(a.4 pts, b. 3 pts, c. 3 pts)

12. sect'n 2.5, #29, a. $C(x) = 0.6x + 12,100$

b. $R(x) = 1.15x$

c. $P(x) = 0.55x - 12,100$

(a.3 pts, b. 3 pts, c. 4 pts)



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| <u>Text Sect'n</u> | <u>test prob #</u> | * |
|--------------------|--------------------|---|
| 1.1 | - | |
| 1.2 | - | * |
| 1.3 | - 6 | |
| 1.4 | - 1 | * |
| 1.5 | - 10 | |
| 1.6 | - 8 | * |
| 1.7 | - 2 | |
| 1.8 | - | * |
| 1.9 | - 5 | |
| 2.1 | - | * |
| 2.2 | - 3 | |
| 2.3 | - 9 | * |
| 2.4 | - 7 | |
| 2.5 | - 12 | * |
| 2.6 | - 4 | |
| 2.7 | - 11 | * |