

Gulf University for Science and Technology

Math 111 Fall2017 Midterm Exam

Date: Nov 2nd, 2017

Name: .. [REDACTED]

ID Number: .. [REDACTED]

Signature: .. [REDACTED]

Instructions

1. Fill in the information above.
2. Please no questions, and no calculators.
3. This Exam is 5 pages including this cover page.
4. Do all your work in this test booklet. Show all your work.

Mr. Mohamud Mohamed	
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2

Objective	1	2	3	4	5	6	7	8	9	Total	%
	/10	/10	/10	/10	/10	/10	/10	/10	/20	/100	/26
										100	26

Questions:

1. [10 points] Solve the inequality: $x^2 - 7x < 30$

$$x^2 - 7x < 30$$

$$x^2 - 7x - 30 < 0$$

$$(x+3) + (-10x-30) < 0$$

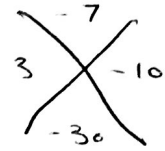
$$x(x+3) - 10(x+3) < 0$$

$$(x-10)(x+3) < 0$$

$$x = 10 \quad | \quad x = -3$$

10

$(x-10)$	-	$(x+3)$	-	+
$(x-10)$	-	$(x+3)$	+	+
$(x-10)(x+3)$	+		-	+



$$x = (-3, 10)$$

2. [10 points] Find the domain of the following functions, write the answer in interval notation.

(a) $g(x) = \frac{\sqrt{x-2}}{x^2-1}$

Domain of $\sqrt{x-2} = [2, \infty)$

Domain of $x^2-1 = \text{all } \mathbb{R} \text{ except } \pm 1$

interval notation:

$$\{x : 2 \leq x < \infty\}$$

(1) [10 points] Solve $\sqrt{x+1} - 3x = 1$

$$\sqrt{x+1} = (3x+1)$$

$$x+1 = (3x+1)(3x+1)$$

$$x+1 = 9x^2 + 3x + 3x + 1$$

$$9x^2 + 5x = 0$$

$$x(9x+5) = 0$$

$$\begin{array}{l} \boxed{x=0} \\ \text{correct} \end{array} \quad \left| \quad \begin{array}{l} 9x+5=0 \\ x = -\frac{5}{9} \end{array} \right.$$

Check:

$$\sqrt{\frac{5}{9} + \frac{9}{9}} - \frac{1}{3}\left(\frac{-5}{9}\right) = 1$$

$$\sqrt{\frac{14}{9}} + \frac{5}{27} = 1$$

$$\frac{2}{3} + \frac{5}{27} \neq 1$$

answer is

$$x=0 \text{ only}$$

3. [10 points] For the function: $f(x) = \begin{cases} x^2 - 2 & : -3 \leq x < 1 \\ 3x + 2 & : x \geq 1 \end{cases}$

Find:

$$(1) f(2) = 3(2) + 2 = 8$$

$$(2) f(1) = 3(1) + 2 = 5$$

$$(3) f(-1) = 1 - 2 = -1$$

$$(4) f(-4) = \text{No solution}$$

(5) y-intercept. \neq

$$x=0, f(0) = 0 - 2 = \boxed{-2}$$

$$\boxed{(0, -2)}$$

4. [10 points] You have 4000 KD to invest and wish to earn 500 KD every year from them. How much should be invested at 5% rate of simple interest, if the rest are invested at 20%?

$$I = Prt$$

$$= 4000 \cdot \frac{20}{100} \cdot 1$$

$$I = 800$$

$t = 1, r_1 = 20\%, r_2 = 5\%, P = 4000$

$$I = 3200 \cdot \frac{5}{100} \cdot 1$$

$$I = 160$$

5. [10 points] Graph the function: $f(x) = -(x - 1)^2 + 4$

$F(x) = a(x-h)^2 + k, a < 0$ max vertex

vertex $(h, k) = (1, 4)$

x int: $0 = -(x-1)^2 + 4$

$-4 = -(x-1)^2$

~~$x-1 = 2$~~ $x-1 = x-1$

~~$x=3$~~

$x = 3 \quad | \quad x = -1$

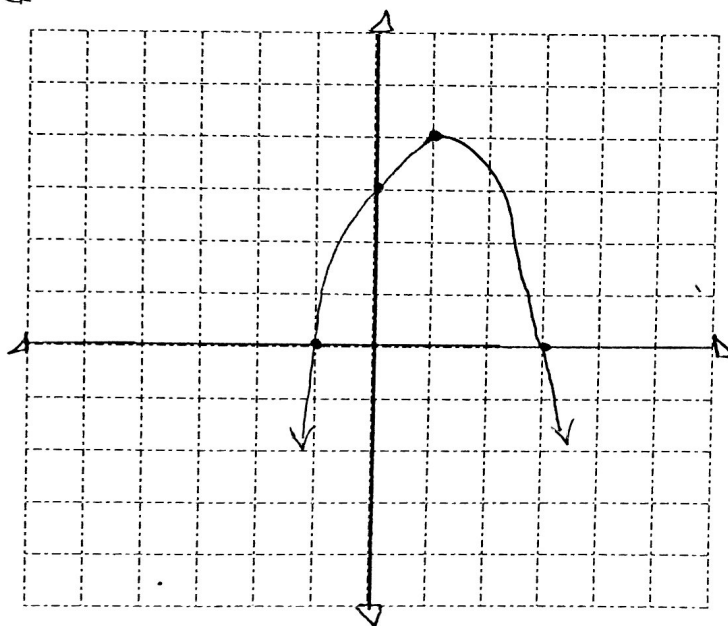
$(3, 0) \quad | \quad (-1, 0)$

y int:

$y = 3 \quad (0, 3)$

Domain: \mathbb{R}

10



$$2x^2 - 2x + x - 1$$

$$2x^2 - x - 1$$

6. [10 points] solve. $\frac{2x-3}{x^2-1} + \frac{2x+1}{x+1} = 1$

$$\frac{2x-3}{x^2-1} + \frac{(2x+1)(x-1)}{x^2-1} - \frac{x^2-1}{x^2-1} = 0$$

$$\frac{2x-3 + 2x^2 - x - 1 - x^2 + 1}{x^2-1} = 0$$

$$\frac{x^2 + x - 3}{x^2-1 \cdot (x^2-1)} = 0 \cdot (x^2-1)$$

$$x^2 + x - 3 = 0$$

$$x = \frac{-1 \pm \sqrt{13}}{2}$$

$$\left. \begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ x &= \frac{-1 \pm \sqrt{1+12}}{2} \end{aligned} \right\}$$

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7. [10 points] Find the extrem value of the given function. Specify is it absolute max or min. $f(x) = 2x^2 - 4x + 3$

Vertex $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

$\left(\frac{4}{4}, 1\right)$ \rightarrow $(1, 1)$
extreme value
absolute minimum.

since $a > 0$

10



Choose the correct Answer:

[20 points]

8. The Solution of $0 \leq 1 - \frac{1}{3}x < 1$ is

- | | | | |
|--------------|--------------|-------------|-------------|
| (a) $(-3,1)$ | (b) $[-3,0)$ | (c) $[3,6)$ | (d) $(0,3]$ |
|--------------|--------------|-------------|-------------|

9. The slope of line through the points $(0,4)$ and $(-1,-2)$ is

- | | | | |
|----------|---------|--------------------|---------|
| (a) -6 | (b) 2 | (c) $-\frac{1}{6}$ | (d) 6 |
|----------|---------|--------------------|---------|

10. The slope of $y = 2$ line could be:

- | | | | |
|---------|----------|-------------------|-------------------------|
| (a) 0 | (b) -2 | (c) $\frac{1}{2}$ | (d) Udefined |
|---------|----------|-------------------|-------------------------|

11. The slope of vertical line is:

- | | | | |
|---------|----------|---------|---------------------|
| (a) 0 | (b) -1 | (c) 1 | (d) <u>Udefined</u> |
|---------|----------|---------|---------------------|

12. The equation of line with parallel to the line $2x - y = 2$; containing the point $(0,1)$ is

- | | | | |
|------------------------------------|----------------------|------------------|-------------------|
| (a) <u>$y - 1 = 2x$</u> | (b) $2y + x - 2 = 0$ | (c) $2y - 2 = x$ | (d) $y - 1 = -2x$ |
|------------------------------------|----------------------|------------------|-------------------|

$$8. -1 \leq -\frac{1}{3}x < 0$$

$$3 > x > 0$$

$$a. \frac{-2 - 4}{-1 - 0} = \frac{-6}{-1} = 6$$

$$12. 2x - y = 2$$

$$y = 2x - 2$$

$$m = 2, (0, 1)$$

$$y - 1 = 2(x - 0)$$

$$y = 2x + 1$$