Prince Sultan University
Department of Mathematical Sciences

MATH 001
Major II Examination
Semester I, Term 171
Tuesday, December 06, 2017
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

***Important Instructions:***

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt of cheating may cause you expulsion from the Exam.
7. This examination has 14 problems, some with several parts and a total of 6 pages including the cover page. Make sure your exam paper has all these pages with all the problems.

| Problems | Max points | Student's Points |
|---|---|---|
| | | |
| 1 , 2 , 3 | 14 | |
| 4 , 5 | 15 | |
| 6 , 7 , 8 | 18 | |
| 9 | 15 | |
| 10 , 11 ,12 , 13 , 14 | 18 | |
| | | |
| Total | 80 | |

| |
|---|
| **20** |

**Show all your steps**

**Q.1 (5 points)** Perform the indicated operations and write the result in standard form: $a+ib$
**(Show all your steps)**

a) $\dfrac{6-7i}{3-2i}$

b) $\left(2-\sqrt{-7}\right)^2$

**Q.2 (3 points)** Given the function $f(x)=\begin{cases} x & x<-1 \\ 1-x^2 & -1\le x\le 1 \\ 2 & x>1 \end{cases}$

Evaluate: a) $f\ (4)=$

b) $f\ (1)=$

c) $f\ (-3)=$

**Q.3 (6 points):** Use the given conditions to write **<u>an equation</u>** of the line in **<u>slope-intercept form.</u>**

a) the line passes through $(-4,7)$ and has x-intercept $-5$

b) the line passes through $(-1,2)$ and perpendicular to the line whose equation is $2x-3y=4$

**Q.4 (3 points)** Find the value of $y$ if the line passing through the two points $(2, y)$ and $(-1, 6)$ has the slope $m = \frac{2}{3}$ .

**Q.5 (12 points) Solve** each of the following inequalities. Show the solution on **the number line** and express the solution set in **interval notation.**

a) $8x + 3 \geq 3(2x + 1) + x + 5$

b) $|2x + 5| + 2 < 11$

c) $3|x + 7| \geq -27$

**Q.6 (3+3+2 points):** If $f(x)=\sqrt{x-2}$ and $g(x)=x+3$.

a) Find $(f\circ g)(x)$

b) Find the Domain of $f\circ g$

c) Find $(g\circ f)(6)$

**Q.7 (8 points):** Use the graph of $f(x)$ given in the figure to answer the following questions:

a) Find the Domain of $f$._____

b) Find the range of $f$ _____

c) Find the $x-$intercepts _____

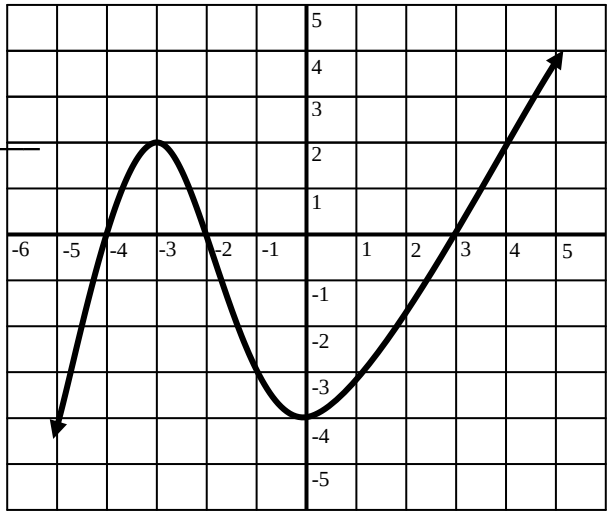
d) Find the $y-$intercepts _____

e) Find intervals on which $f$ is increasing, if any

_____

f) Find intervals on which $f$ is decreasing, if any

_____




g) Find the **points,** if any, where $f$ has a relative maximum _____

i) Determine whether $f$ is even, odd, or neither.(Give the reason) _____

_____

k) $f(-1)=$_____

$f(3)=$_____

**Q.8 (2 points):** Find $(f+g)(x)$ given $f(x)=2x^2+8$ and $g(x)=x^2-3x+4$**. Simplify**

**Q.9 (15 points): Solve** each of the following equations. Give the **Solution Set.**

a) $\sqrt{2x+18}-5=x$

b) $(2x+3)(x+4)=1$

c) $4x^4-13x^2+9=0$

d) $x^2-12x+4=0$ **(Use completing the square method)**

e) $3(x-4)^2=36$

**Q.10 (3 points);** Determine whether the function $f(x) = 2x^3 - 3x$ is even , odd, or neither? **Explain**

**Q.11 (3 points):** Find the average rate of change of $f(x) = x^2 + 2x$ from $x_1 = 3$ to $x_2 = 5$

**Q.12 (2 points)** Find the **domain** of $f(x) = \sqrt{5x + 35}$

**Q.13 (4 points):** Find the Difference-Quotient, $\frac{f(x+h) - f(x)}{h}$ for $f(x) = 5x^2 - 2$

**Q.14 (6 points):** Begin by graphing $f(x) = |x|$ and use transformations to graph $g(x) = -2|x - 4| + 3$.
**(Show all the graphs and give the $y-$intercept for the last graph)**