# Prince Sultan University
## Department of Mathematical Sciences

MATH 001
Final Examination
Semester II, Term 102
Tuesday, June 7, 2011
Time Allowed: 120 minutes

Student Name: _____

Student ID #: _____

| Circle your section | | | | | |
|---|---|---|---|---|---|
| Dr. Jehad | | Dr. Muaffaq | | Dr. Bahaa | Dr. Saleem |
| 9:00—10:00 | 10:00 – 11:00 | 11:00 –12:00 | 13:00—14:00 | 10:00—11:00 | 8:00—9:00 |
| 208 | 206 | 202 | 203 | 201 | 205 |

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. If your mobile phone is seen or heard, your exam will be taken immediately.
6. You must show all your work beside the problem. Be organized.
7. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
8. This examination has 24 problems. Make sure your paper has all these problems.

| Problems | Max points | Student's Points |
|---|---|---|
| 1,2,3,4,5,6,7 | 14 | |
| 8,9,10,11 | 15 | |
| 12,13,14,15 | 14 | |
| 16,17,18,19,20 | 15 | |
| 21,22,23 | 13 | |
| 24 | 9 | |
| Total | 80 | |

Q1. [2 points] Find the following $\{1,2,3,4,5\} \cap \{2,4,6,8\}$.

Q2. [2 points] List the numbers in $\left\{-9,\ -1.3,\ 0,\ 0.\overline{3},\ \frac{\pi}{2},\ \sqrt{9},\ \sqrt{10}\right\}$ that are rational.

Q3. [2 points] Expand $(2+3i)^2$ without using a calculator.

Q4. [2 points] Write $\frac{-15-\sqrt{-18}}{33}$ in the standard form $a+bi$. Do not use a calculator.

Q5. [2 points] Factorize $8x^3+64$.

Q6. [2 points] Rationalize $\frac{13}{\sqrt{7}-\sqrt{3}}$ without using a calculator.

Q7. [2 points] Simplify $\sqrt{63x}-\sqrt{28x}$.

Q8. [4 points] Perform the indicated operation $\frac{x^2+x}{x^2-4} \div \frac{x^2-1}{x^3+2x^2-4x-8}$ . Simplify as much as possible.

Q9. [3 points] Simplify $\frac{\left(xy^{-2}\right)^{-2}}{\left(x^{-2}y\right)^{-3}}$ .

Q10. [4 points] Solve the following inequality $\frac{1}{2}|x-1|+2 \geq 8$ . Express the solution in interval notation.

Q11. [4 points] Solve the following equation $\frac{1}{x-4}-\frac{5}{x+2}=\frac{6}{x^2-2x-8}$

Q12. [4 points] Use quadratic formula to solve the equation $\sqrt{2}x^2 + 3x - 2\sqrt{2} = 0$ .

Q13. [2 points] Write the standard form of the equation of the circle with radius $r = 6$ and center $(-2, 4)$ .

Q14. [4 points] Solve the following equation $3|2x-1| = 21$

Q15. [4 points] Find an equation of a line whose graph passing through $(-6, 4)$ and is perpendicular to the line whose equation is $2x + y - 6 = 0$.

Q16. [4 points] Given $f(x)=\frac{1}{2}x-1$. Find the inverse function $f^{-1}(x)$.

Q17. [2 points] Find the domain of $f(x)=\sqrt{2x-8}$.

Q18. [2 points] Evaluate $f(7)$ if $f(x)=\begin{cases}\sqrt{x-4}\ , & x\geq 4\\ x^2+2\ , & x<4\end{cases}$

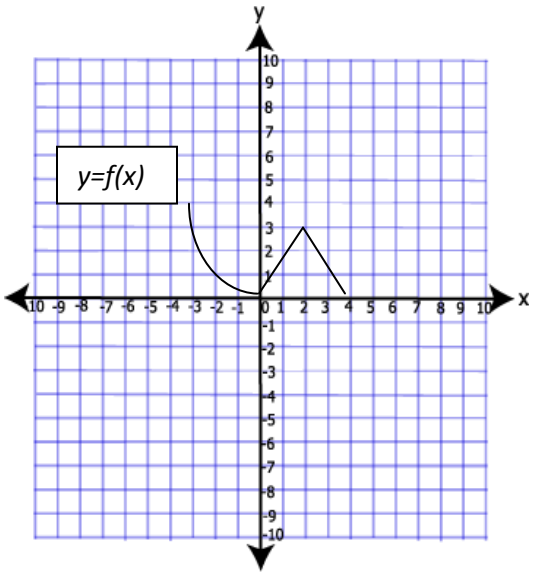
Q19. [ 2 points] Given $f(x)=x^2+4$ and $g(x)=\sqrt{x+1}$. Find $(g\circ f)(7)$.

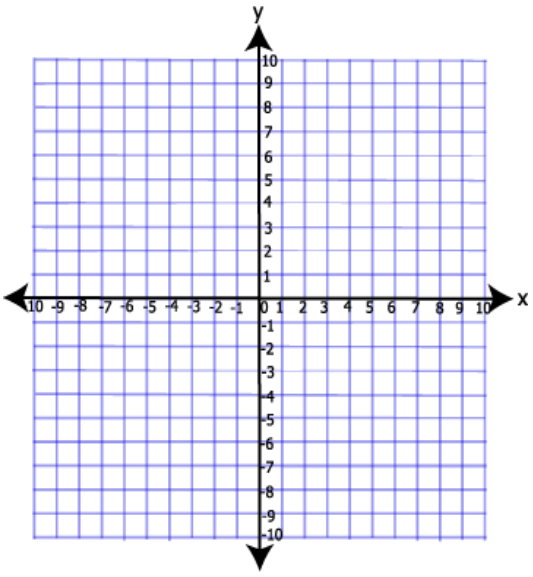
Q20. [5 points] Use synthetic division to solve the equation $x^3+2x^2-5x-6=0$ given that $-1$ is a zero of $f(x)=x^3+2x^2-5x-6$.

Q21. [4 points] Solve the following equation $3(x-4)^2 = -15$.

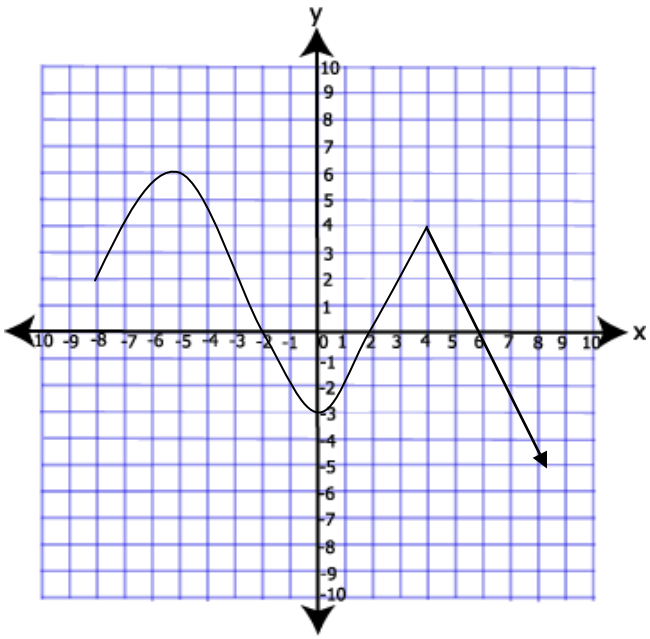
Q22. [4 points] Solve the inequality $x^2 - 6 > -5x$ and graph the solution set on the number line. Express the solution in interval notation.

Q23. [5 points] Consider the given graph of $y = f(x)$. Then use transformations of this graph to graph $g(x) = -f(x-1) + 2$.



Q24. [9 points ] Use the graph of $f(x)$ to determine each of the following:




a) the domain of $f(x)$:

b) the range of $f(x)$:

c) the intervals on which $f(x)$ is increasing:

d) $x-$ intercepts and $y-$ intercepts, if any:

e) the *points*, if any, where $f(x)$ has a relative maximum:

f) Is $f(x)$ even, odd, or neither?

g) Does $f(x)$ has an inverse? Give the reason

h) $f(3) =$

i) Values of $x$ for which $f(x) = 2$: