PRACTICE TEST

1. Let $f(x)=\begin{cases}7-2x, x\le 3\\ 4x^2-1, x>3\end{cases}$.

a) Find $f(-2)$

b) Find $f\left(\sqrt{10}\right)$.

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2. Let $f(x)=2x-3$. Answer the following questions:

a) Graph $f(x)$. Label the axes and the points used.

b) What is the slope of the line?

c) Is f a function? Explain.

d) Find the domain and range of f.

e) Does f have an inverse? Why? Find $f^{-1}(x)$.

f) Find $\dfrac{f(a+h)-f(a)}{h}$ and simplify.

g) If $g(x)=1-x^2$, find $(f\circ g)(x)$ and $(g\circ f)(0)$.

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3. Let $f(x)=\sqrt{x-2}$. Answer the following questions:

a) Find the domain and range of the function.

b) Sketch the graph of the function. Label the axes and the points used.

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4. Find the domain of each function.

a) $f(x)=\dfrac{3x+8}{2x-7}$

b) $g(x)=\log_5(x+2)$

c) $l(x)=\dfrac{1}{x^2+5x+6}$

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5. Simplify the following:

a) $(1+i)^2-3(1-4i)-2$

b) $\dfrac{1+i}{1-3i}+\dfrac{1-i}{1+3i}$

c) $\log_6\left(\log_5\left(\log_2 32\right)\right)$

6. Solve the following equations:

a) $\left|x+\frac{1}{2}\right|=\frac{1}{5}$

b) $|2x+1|=|x-1|$

c) $\log_3(2x-1)=2$

d) $5^x=2$

e) $\log_8(x+3)-\log_8 3=1$

f) $2x^4+4=6x^2$

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7. Solve the following equations or systems of equations:

a) Solve (in the complex number set $\mathbb{C}$) by extracting roots $3(x-2)^2+39=0$

b) Solve (in the complex number set $\mathbb{C}$) by the quadratic formula $-x^2+\frac{x}{2}=1$

c) Solve the following system of equations: $\begin{cases} x-y+z=6 \\ x+y+z=4 \\ 4x+2y+z=9 \end{cases}$

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8. Solve the following inequalities. Show clearly how you obtain your answers.

a) $x^2-7x+10\geq 0$

b) $\frac{1}{x-2}>\frac{1}{x+3}$

c) $|3x-2|+5\leq 15$

d) $2|4x+3|>10$

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9. Let $y=-2x^2+4x+1$.

a) What type of curve is this?

b) What is the *y*-intercept?

c) What is the vertex ?

d) Find the *x*- intercept(s) (if any).

e) Sketch its graph. Label the axes, the vertex, and the intercepts.

f) Find the domain and range .

h) Using the graph above, solve the following inequality

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

10. Let $3x^2+3y^2+5x-4y-1=0$.

a) What type of curve is this?

b) What is the standard form of this equation?

c) What is the center?

d) What is the radius?

e) Find the *x*-intercepts (if any).

f) Find the *y*-intercepts (if any).

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11. a) Use the Binomial Theorem to expand the binomial and express the result in simplified form $(2x+y)^4$

b) Find the sum and express the result in simplified form $\sum_{i=1}^{3}\frac{(i+2)!}{i!}$

c) Find the sum $\sum_{k=0}^{5}\binom{5}{k}$

d) Express the sum using summation notation $\frac{1}{2}+\frac{2}{3}+\frac{3}{4}+\ldots+\frac{14}{15}$

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12. The total profit Kiyoshi makes from producing and selling "x" floral arrangements is

$$P=-0.3x^2+30x$$

a) How many floral arrangements should Kiyoshi produce and sell to maximize his profit?

b) What is his maximum profit? Explain how do you know for sure you have found the maximum profit.

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13. The number of bacteria present in a culture after *t* hours is given by the formula

$$P=1500e^{0.59t}.$$

a) How many bacteria will be there after ½ hour?

b) How long will it be before there are 1,000,000 bacteria?