Calculus Diagnostic Test

Name:_____ Department:_____ I.D.#_____

Success in calculus depends to a large extent on knowledge of the mathematics that precedes calculus. The following test is intented to diagnose weaknesses that you might have. After taking the test you can check your answers against the given aswers and if necessary, refresh your skills by referring to the review materials that are provided.

1. Evaluate each expression without using a calculator：
   (a) $(-3)^4$
   (b) -3^4
   (c) 3^{-4}
   (d) $\dfrac{5^{23}}{5^{21}}$
   (e) $\left(\dfrac{2}{3}\right)^{-2}$
   (f) $16^{-3/4}$
2. Simplify each expression. Write your answer without negative exponents.
   (a) $\sqrt{200}-\sqrt{32}$
   (b) $(3a^3b^3)(4ab^2)^2$
   (c) $\left(\dfrac{3x^{3/2}y^3}{x^2y^{-1/2}}\right)^{-2}$
3. Expand and simplify.
   (a) $3(x+6)+4(2x-5)$
   (b) $(x+3)(4x-5)$
   (c) $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$
   (d) $(2x+3)^2$
   (e) $(x+2)^3$
4. Factor each expression.
   (a) $4x^2-25$
   (b) $2x^2+5x-12$
   (c) $x^3-3x^2-4x+12$
   (d) x^4+27x
   (e) x^3y-4xy
5. Simplify the rational expression.
   (a) $\dfrac{x^2+3x+2}{x^2-x-2}$
   (b) $\dfrac{2x^2-x-1}{x^2-9}\cdot\dfrac{x+3}{2x+1}$
   (c) $\dfrac{x^2}{x^2-4}-\dfrac{x+1}{x+2}$
   (d) $\dfrac{\dfrac{y}{x}-\dfrac{x}{y}}{\dfrac{1}{y}-\dfrac{1}{x}}$

6. Rationalize the expression and simplify.

   (a) $\dfrac{\sqrt{10}}{\sqrt{5}-2}$

   (b) $\dfrac{\sqrt{4+h}-2}{h}$

7. Solve the equation. (Find only the real solutions.)

   (a) $x+5=14-\dfrac{1}{2}x$

   (b) $\dfrac{2x}{x+1}=\dfrac{2x-1}{x}$

   (c) $x^2-x-12=0$

   (d) $2x^2+4x+1=0$

   (e) $x^4-3x^2+2=0$

   (f) $2x(4-x)^{-1/2}-3\sqrt{4-x}=0$

8. Solve each inequality. Write your answer using interval notation.

   (a) $-4<5-3x\le 17$

   (b) $x^2<2x+8$

   (c) $x(x-1)(x+2)>0$

9. State whether each equation is true or false.

   (a) $p^2+q^2=(p+q)^2$

   (b) $\sqrt{ab}=\sqrt{a}\sqrt{b}$

   (c) $\sqrt{a^2+b^2}=a+b$

   (d) $\dfrac{1+TC}{C}=1+T$

   (e) $\dfrac{1}{x-y}=\dfrac{1}{x}-\dfrac{1}{y}$

   (f) $\dfrac{1/x}{a/x-b/x}=\dfrac{1}{a-b}$

10. Find an equation for the line that passes through the point $(2,-5)$ and

    (a) has slope -3

    (b) is parallel to the x-axis

    (c) is parallel to the y-axis

    (d) is parallel to the line $2x-4y=3$

11. Find an equation for the circle that has center $(-1,4)$ and passes through the point $(3,-2)$.

12. Let $A(-7,4)$ and $B(5,-12)$ be points in the plane

    (a) Find the slope of the line that contains A and B.

    (b) Find an equation for the line that passes through A and B. What are the intercepts?

    (c) Find the length of the segment AB.

13. Sketch the region in the xy-plane defined by the equation or inequalities.

    (a) $y=1-\dfrac{1}{2}x$

    (b) $y<1-\dfrac{1}{2}x$

    (c) $y=x^2-1$

    (d) $x^2+y^2=4$

    (e) $-1\le y\le 3$