

$$56/56 = 100$$

University of North Georgia  
Math 0999 – Support for College Algebra  
Final Exam

Name: Key Date: \_\_\_\_\_

Show ALL work neatly on this exam.

Solve the following equations for the specified variable.

1.  $2x + 7 = 31$

$$2x = 24$$

$$\boxed{x = 12}$$

2.  $5(x + 3) + 9 = -2(x - 2) - 1$

$$5x + 15 + 9 = -2x + 4 - 1$$

$$5x + 24 = -2x + 3$$

$$7x = -21$$

$$\boxed{x = -3}$$

3.  $\frac{1}{x} = \frac{4}{3x} + 1$

$$3 = 4 + 3x$$

$$-1 = 3x$$

$$\boxed{-\frac{1}{3} = x}$$

$$\frac{1}{-\frac{1}{3}} = \frac{4}{3(-\frac{1}{3})} + 1$$

$$-3 = -3 \checkmark$$

4.  $(x + 2)^2 = 4$

$$x + 2 = \pm 2$$

$$x = \pm 2 - 2$$

$$\boxed{x = 0 \text{ or } x = -4}$$

Solve by *Completing the Square*.

5.  $x^2 + 8x + 12 = 0$

$$x^2 + 8x = -12$$

$$8 \cdot \frac{1}{2} = 4$$

$$4^2 = 16$$

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

$$x + 4 = \pm 2$$

$$x = \pm 2 - 4$$

$$\boxed{\textcircled{1} x = -2 \text{ or } \textcircled{2} x = -6}$$

6. Given  $f(x) = 3x + 2$ , find  $f(x+2)$

$$\begin{aligned} f(x+2) &= 3(x+2) + 2 \\ &= 3x + 6 + 2 \\ &= \boxed{3x + 8} \end{aligned}$$

7. Find the Domain of  $f(x) = \sqrt{x-5}$

$$x - 5 \geq 0$$

$$x \geq 5$$

$$\boxed{\text{Domain: } [5, \infty)}$$

Use  $p = (-3, -2)$  and  $q = (5, 8)$  for the following two questions.

8. Find the equation of the line passing through  $p$  and  $q$  in Standard form.

$$m = \frac{8 - (-2)}{5 - (-3)} = \frac{10}{8} = \frac{5}{4}$$

$$4(y - 8) = \frac{5}{4}(x - 5)$$

$$\begin{aligned} 4y - 32 &= 5(x - 5) \\ &= 5x - 25 \end{aligned}$$

$$-5x + 4y = 7$$

$$\boxed{5x - 4y = -7}$$

$$5(-3) - 4(-2) = -7$$

$$-15 + 8 = -7$$

$$-7 = -7 \checkmark$$

9. If  $p$  and  $q$  are endpoints of the diameter of a circle, find the equation of the circle which passes through  $p$  and  $q$ .

$$d = \sqrt{(8)^2 + (10)^2}$$

$$= \sqrt{64 + 100}$$

$$= \sqrt{164}$$

$$\approx 12.806$$

$$r \approx \frac{12.806}{2}$$

$$\approx 6.403$$

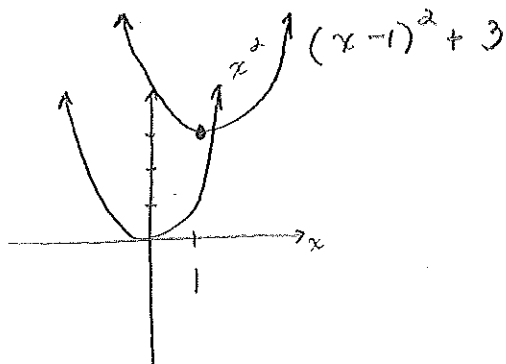
$$\text{Mid-pt. } \left( \frac{-3+5}{2}, \frac{-2+8}{2} \right)$$

$$(1, 3)$$

$$(x-1)^2 + (y-3)^2 = (6.403)^2$$

$$\boxed{(x-1)^2 + (y-3)^2 = 41}$$

10. Use the graph of  $f(x) = x^2$  to graph  $g(x) = (x - 1)^2 + 3$



11. Let  $f(x) = \frac{1}{x-2}$  and  $g(x) = \sqrt{x}$ , find  $\frac{f}{g}$ .

$$\frac{f}{g} = \frac{\frac{1}{x-2}}{\sqrt{x}} = \frac{1}{x-2} \div \frac{\sqrt{x}}{1} = \frac{1}{x-2} \cdot \frac{1}{\sqrt{x}} = \boxed{\frac{1}{(x-2)\sqrt{x}}}$$

12. Let  $s(x) = x^2$  and  $t(x) = x - 3$ , find  $(s \circ t)(x)$

$$\begin{aligned} (s \circ t)(x) &= s(t(x)) \\ &= (x-3)^2 \\ &= (x-3)(x-3) \\ &= x^2 - 6x + 9 \end{aligned} \quad \boxed{x^2 - 6x + 9}$$

13. Rewrite the following in Exponential form and simplify:  $\log_6 36 = 2$

$$\begin{aligned} \log_6 36 &= 2 \\ 6^2 &= 36 \\ 6^2 &= 6^2 \end{aligned}$$

14. Solve  $3^{x+2} = 7$

$$\begin{aligned} \ln 3^{(x+2)} &= \ln 7 \\ (x+2) \ln 3 &= \ln 7 \\ x \ln 3 + 2 \ln 3 &= \ln 7 \\ x \ln 3 &= \ln 7 - 2 \ln 3 \\ x &= \frac{\ln 7 - 2 \ln 3}{\ln 3} \\ &\approx -0.23 \end{aligned}$$