

Fall 2006

Professor Katiraie Math 103

Quiz Eight Form B

(20 Pts)

Name Solution

1) Find the inverse of the following functions (2.5 points each)

a) $f(x) = 3x + 4$

b) $g(x) = \frac{x}{4}$

step I) $y = 3x + 4$

$$y = \frac{x}{4}$$

step II) Solve for x $3x = y - 4$

$$4y = x$$

$$x = \frac{y-4}{3}$$

step III)

$$f^{-1}(x) = \frac{x-4}{3}$$

$$x = 4y$$

$$g^{-1}(x) = 4x$$

2) Solve $x^2 + 6x = -2$ by completing square method. (3 points)

$$x^2 + 6x + 9 = -2 + 9$$

$$\left(\frac{6}{2}\right)^2 = 9$$

$$(x+3)^2 = 7$$

$$x+3 = \pm\sqrt{7}$$

$$x = -3 \pm \sqrt{7}$$

3) Solve $5x^2 + 1 = 5x$, using the quadratic formula. (3 points)

$$5x^2 - 5x + 1 = 0 \quad a = 5, \quad b = -5, \quad c = +1$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(5)(+1)}}{2(5)} = \frac{5 \pm \sqrt{25 - 20}}{10} = \frac{5 \pm \sqrt{5}}{10}$$

4) Solve $2x(2-x) = 3-2x$, using the quadratic formula.

(3 points)

$$\begin{array}{r} 4x - 2x^2 = 3 - 2x \\ +2x \qquad \qquad +2x \\ \hline -2x^2 + 6x - 3 = 0 \end{array} \quad a = -2 \quad b = 6 \quad c = -3$$

$$\begin{aligned} x &= \frac{-6 \pm \sqrt{36 - 4(-2)(-3)}}{2(-2)} = \frac{-6 \pm \sqrt{36 - 24}}{-4} = \frac{-6 \pm \sqrt{12}}{-4} \\ &= \frac{-6 \pm 2\sqrt{3}}{-4} = \boxed{-\frac{3}{2} \pm \frac{\sqrt{3}}{2}} \quad \text{OR} \quad \boxed{\frac{-3 \pm \sqrt{3}}{2}} \end{aligned}$$

5) Write $y = 3x^2 + 6x + 1$ in vertex form. Identify the vertex.

(3 points)

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

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

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

$$\text{Vertex} = (-1, -2)$$

6) Find the vertex and the axis of symmetry for the graph of

(3 points)

$$f(x) = -\frac{1}{2}x^2 + x + \frac{3}{2}$$

$$x = \frac{-b}{2a} = \frac{-1}{2(-\frac{1}{2})} = \frac{-1}{-1} = 1 \quad \left. \vphantom{x = \frac{-b}{2a}} \right\} \text{Vertex} = (1, 2)$$

$$y = -\frac{1}{2} + 1 + \frac{3}{2} = 2$$

$$x = 1 \text{ axis of symmetry}$$