MCR3UN – Quiz #5

Full Name: SOLNS **Per:** 1/2

Date: November 2nd, 2023

- Approved calculators are permitted
- Answers should belong to the real number set
- Answers should be exact unless otherwise stated

1. Solve the following quadratic equations

a) $(x-2)(x-1)+x(x-1)+1=x$

$x^2-3x+2+x^2-x+1-x=0$

$2x^2-5x+3=0$

$(2x-3)(x-1)=0$

$x=\frac{3}{2}$ $x=1$

b) $x^2-2x=6$

$x^2-2x-6=0$

$x=\frac{-(-2)\pm\sqrt{4-4(1)(-6)}}{2(1)}$

$x=\frac{2\pm\sqrt{28}}{2}$

$x=\frac{2\pm 2\sqrt{7}}{2}$

$x=1\pm\sqrt{7}$

2. Convert $f(x)=-2(x-4)^2+18$ to...

a) standard form

b) factored form

see period 8/9 solutions

3. Convert $h(x)=5x^2+30x-4$ to vertex form

see period 8/9 solutions

4. For what value(s) of *k* will the function $f(x) = 4x^2 - 8x + k - 3$ have two distinct real roots?

see period 8/9 solutions

5. Determine the nature of the roots: (circle one of the three possible answers)

a) $j(x) = 13x^2 - 13x$ 2 equal real roots (2 distinct real roots) 2 non-real roots

$= 13x(x-1)$

b) $h(x) = -\frac{3}{4}(x-2)^2$ (2 equal real roots) 2 distinct real roots 2 non-real roots

$K = 0$

c) $f(x) = 2(x-3)^2 - 4$ 2 equal real roots (2 distinct real roots) 2 non-real roots

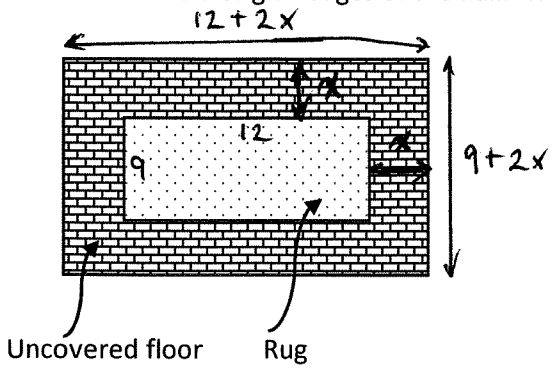
(+) (−)

d) $g(x) = 2x^2 - 9x + 11$ 2 equal real roots 2 distinct real roots (2 non-real roots)

$D = -7$

$D < 0$

6. A rug measuring 9 m by 12 m was installed in the recreation hall. A strip of floor of equal width was left uncovered along all edges of the hall. The area of the uncovered floor is 270 m^2. How wide is the uncovered strip?



Let x represent the width of the uncovered strip (m).

$(12+2x)(9+2x) = 270 + 9(12)$

$108 + 24x + 18x + 4x^2 = 270 + 108$

$4x^2 + 42x - 270 = 0$

$2x^2 + 21x - 135 = 0$

$(2x - 9)(x + 15) = 0$

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$x = \frac{9}{2}$ $\quad x = -15$ (INADMISSABLE)

∴ The uncovered strip is 4.5m wide.

7. A skier jumps off a cliff. The motion of the skier can be modeled by the function $h(d) = -0.2d^2 + 0.8d + 4.2$ where h is his height above the ground, and d is his horizontal distance from the cliff, both in metres.

a. How high is the cliff? 4.2 m ✓

b. How far horizontally will the skier travel from the cliff before landing on the ground?

set $h = 0$

$0 = -0.2d^2 + 0.8d + 4.2$

$0 = d^2 - 4d - 21$

$0 = (d-7)(d+3)$ ✓✓

$d = 7$ $\quad d = -3$

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∴ The skier travelled 7m before landing.

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8. Fill in the chart for the function: $h(x) = 3x^2 - 12x + 9$

y-intercept	$(0,9)$
x-intercept(s)	$(1,0)$ $(3,0)$
Axis of symmetry	$x = 2$
Direction of Opening	up
Optimal Value (min of ____ or max of ____)	min of -3
Vertex	$(2,-3)$

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9. Determine the point(s) of intersection of the functions $f(x) = 3x^2 - 11x - 8$ and $g(x) = 2x + 2$ algebraically.

set $f(x) = g(x)$

$3x^2 - 11x - 8 = 2x + 2$

$3x^2 - 13x - 10 = 0$

$(3x+2)(x-5) = 0$

$x = \frac{-2}{3}$ $\quad x = 5$

$g\left(\frac{-2}{3}\right) = 2\left(\frac{-2}{3}\right) + 2$

$= \frac{-4}{3} + \frac{6}{3}$

$= \frac{2}{3}$

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$g(5) = 2(5) + 2$

$g(5) = 12$

$\therefore$ POIs are $\left(\frac{-2}{3}, \frac{2}{3}\right)$ AND $(5, 12)$

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