Midterm Practice Spring 2020

1. Solve the equation with radicals. Make sure to check all your answers.
   (a) $\sqrt{-3x+1}-1=-x$
   (b) $\sqrt{-3x+1}-1=x$

2. Simplify the following expressions involving radicals:
   (a) $-2\sqrt{50}+4\sqrt{32}-\sqrt{8}-\sqrt{12}$
   (b) $3\sqrt{12}-8\sqrt{27}+10\sqrt{3}$
   (c) $(3-2\sqrt{2})^2$
   (d) $27^{-2/3}$
   (e) $\dfrac{-6}{4+\sqrt{2}}$
   (f) $\left(\dfrac{8x^{10}y^3}{2x^2y^5}\right)^{\frac{1}{2}}$

3. Perform the following operations with complex numbers
   (a) $(\frac{3}{2}-9i)-(-\frac{3}{2}-2i)$
   (b) $(\frac{3}{2}-9i)+(-\frac{3}{2}-2i)$
   (c) $(5-6i)(1+3i)$
   (d) $\dfrac{-2-2i}{3+i}$

4. Given the quadratic function:
$$f(x)=-3x^2+9x+12$$
   (a) Find the y-intercept.
   (b) Find the x-intercepts.
   (c) Find the vertex.
   (d) Sketch the graph.
   (e) Find the equation of the axis of symmetry.

5. Solve the quadratic equation and simplify your answers. Indicate if you can find real solutions. In the case of real solutions, how many different solutions are there?
   (a) $3x^2-6x=2$
   (b) $3x^2-6x=-2$
   (c) $3x^2-6x=-3$

6. Simplify:

(a) $\dfrac{5n^2-2n-7}{25n^2-49}$

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

(c) $\dfrac{a-b}{7}-\dfrac{8-4b}{5}$

(d) $\dfrac{x+4}{x-5}-\dfrac{x-1}{x+2}$

(a') $\dfrac{x-3}{x+2}-\dfrac{2x-1}{x+2}$

(b') $\dfrac{x^2-8x+15}{x^2-x-6}\div\dfrac{x^2+x-20}{x^2-6x+8}$

(c') $\dfrac{3x+2}{x-3}-\dfrac{7x+1}{x^2-4x+3}$

(d') $\dfrac{\dfrac{3}{x-3}-\dfrac{2}{x}}{\dfrac{x^2-36}{x^2-3x}}$

7. For the rational expression $f(x)=\dfrac{2x-6}{2x^2-x-3}$

(a) Find the domain of definition.

(b) Simplify the expression.

8. Solve the equation:

$$\frac{20}{x^2+x-6}+\frac{6}{x+3}=\frac{5}{x-2}$$