MATHEMATICS 115   SPRING 2016

INSTRUCTIONS: ANSWER ALL QUESTIONS. <u>SHOW ALL WORK</u>

1)   Solve the following system:

$$\begin{cases} x + 7y = -2 \\ 3x + y = 34 \end{cases}$$

2)   Let $P(10, 0)$ and $Q(-6, -4)$ be points in the plane.

a) Find the midpoint of the line segment $\overline{PQ}$.

b) Find an equation of a line that passes through the midpoint found in part (a) and is perpendicular to the line $2x + 4y = 12$.

3)   Sketch the graph of $-7x - 5y = -70$. Label the x- and y- intercepts.

4)   Write an equation of the line that passes through the points $(2, 7)$ and $(7, 27)$.

5)   Factor completely: $18x^3y - 6x^2y - 60xy$

6)   Simplify and write the answer with positive exponents only:

$$\left(\frac{1}{5}a^{-2}b^3c\right)^{-2}\left(\frac{2}{3}a^4b^{-6}c\right)^{-1}$$

7)   Simplify: $7\sqrt{50a^3b^4c} - 2ab\sqrt{162ab^2c}$

8)   Simplify: $\dfrac{\dfrac{2}{x+1} + 3}{\dfrac{5}{x+1} - \dfrac{4}{x-1}}$

9)   a) Given $f(x) = 3x^2 + 2x - 5$ and $g(x) = \sqrt{2x - 1}$, find:

i) $f(2) - g(13)$

ii) $f(x + h)$

iii) the domain of $\dfrac{g(x)}{f(x)}$

b) Sketch the graph of $y = f(x)$ from part (a). Label the intercepts.

10)   Divide: $\dfrac{x^2-4}{x^2+2x-8} \div \dfrac{x+2}{x^2+7x+12}$

11)   Combine: $\dfrac{5x}{x^2-16} - \dfrac{7}{x^2+7x+12}$

12)   Solve for x: $\dfrac{2x}{x+3} + \dfrac{5}{x-7} = \dfrac{8x-6}{x^2-4x-21}$

13)   Divide using long division: $(x^4 - 3x^3 - 8x^2 + 12x + 16) \div (x - 4)$

14)   Solve for x: $6x^2 = 10x$

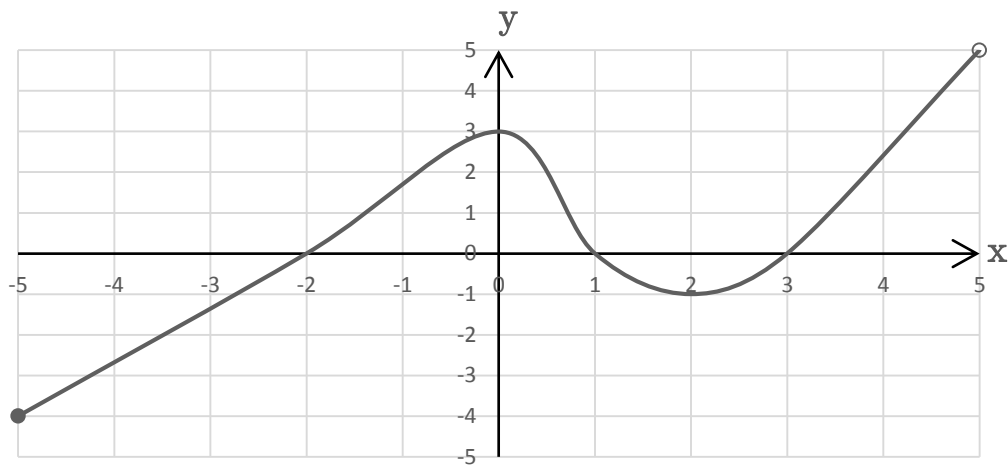15) Solve for x: $\sqrt{3x+1} = 3 + \sqrt{x-4}$

16) Rationalize and simplify: $\frac{2}{3+\sqrt{5}}$

17) Find the center and radius of the circle with the following equation:
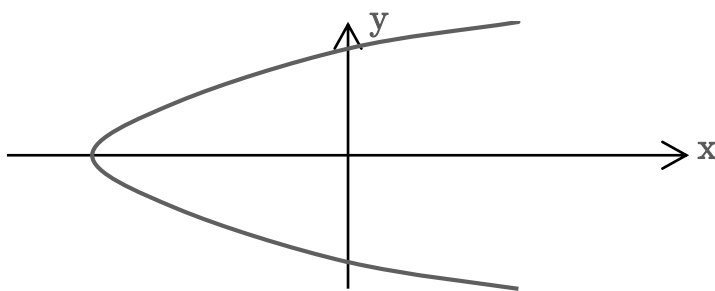
$$x^2 - 6x + y^2 + 18y = 54$$

18) Use the graph of $y = f(x)$ shown below to find:

    a) the domain of $f(x)$

    b) the range of $f(x)$

    c) the value(s) of x for which $f(x) = 0$

    d) $f(0)$

19) Determine whether each of the following is a function and in each case explain your answer.

    a) $\{(5, 10),\ (8, 5),\ (12, 4),\ (3, 6),\ (5, 8)\}$

    b)

20) The local fair offers two options for admission and ride tickets. For option 1, you pay \$22 for admission and 50 cents per ride ticket. For option 2, you pay \$15 for admission and 75 cents per ride ticket.

    a) Write the cost of each option as a function of the number of rides.

    b) Find the number of rides that will result in the same cost for both options.