

QUEENS COLLEGE
MATHEMATICS DEPARTMENT

FINAL EXAM
 $2\frac{1}{2}$ HOURS

Mathematics 115

Fall 2015

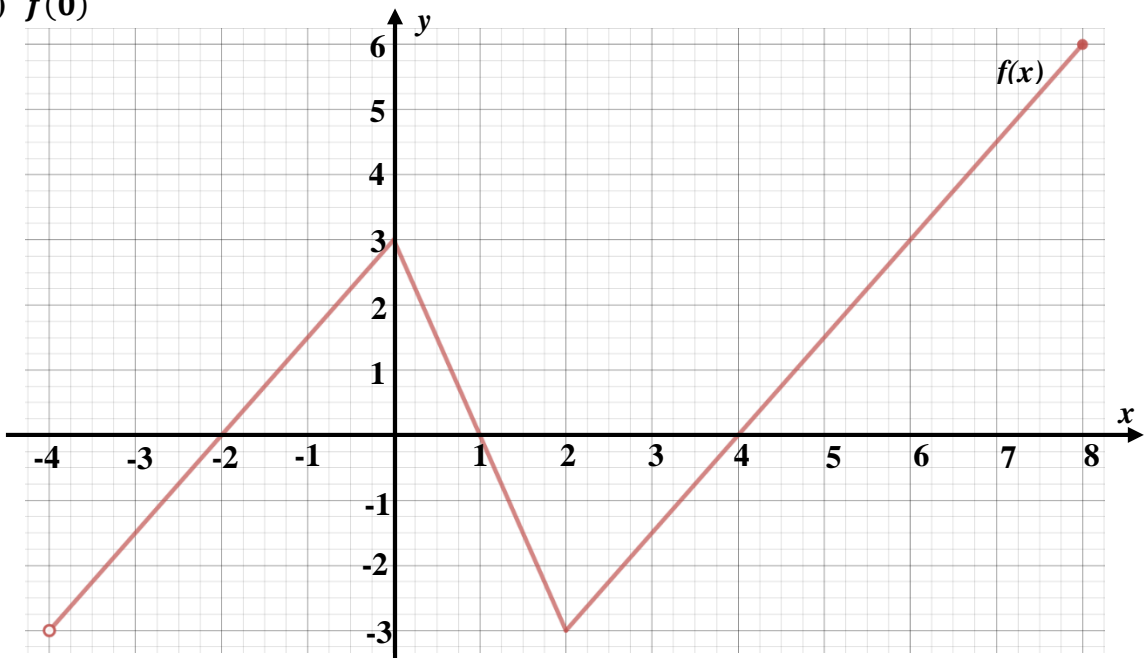
INSTRUCTIONS: ANSWER ALL QUESTIONS. SHOW ALL WORK

- 1) Sketch the graph of $-4x + 7y = 28$. Label the x - and y -intercepts.
- 2) Write an equation of the line that passes through the points $(6, -1)$ and $(-2, 3)$.
- 3) Let $P(-6, 4)$ and $Q(0, 4)$ be points in the plane.
 - a) Find the midpoint of the line segment PQ .
 - b) Find an equation of a line that passes through the midpoint found in part (a) and is perpendicular to the line $3x + 2y = 10$.
- 4) Solve the following system:
$$\begin{cases} 4x + 3y = -5 \\ 5x - 2y = 11 \end{cases}$$
- 5) a) Given $f(x) = x^2 - 6x + 5$ and $g(x) = \sqrt{x - 3}$, find:
 - i) $f(-2) - g(12)$
 - ii) $f(x + h)$
 - iii) the domain of $\frac{g(x)}{f(x)}$b) Sketch the graph of $f(x)$ from part (a). Label the intercepts.
- 6) Factor completely: $6x^3y - 15x^2y + 6xy$
- 7) Simplify and write the answer with positive exponents only:
$$\frac{(3x^2y^{-1})^{-2}(9x^{-6}y^4)^{-\frac{1}{2}}}{(x^{12}y^{-6})^{-\frac{1}{3}}}$$
- 8) Divide: $\frac{x^2-3x-28}{3x^2-9x} \div \frac{49-x^2}{x^2+4x-21}$
- 9) Combine: $\frac{3}{x-2} - \frac{5}{x+2} - \frac{6x}{x^2-4}$
- 10) Simplify: $\frac{1 - \frac{4}{2x+3}}{x - \frac{2}{2x+3}}$
- 11) Solve for x : $\frac{x}{x-3} - \frac{4}{x+1} = \frac{x^2}{x^2-2x-3}$
- 12) Divide using long division: $(3x^3 - 4x + 5) \div (x + 2)$

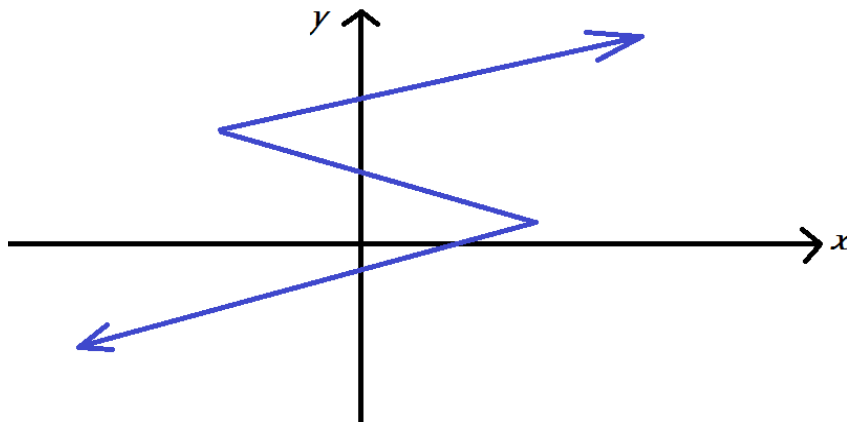
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- 13) Solve for x : $x(x - 4) = 6$
- 14) Simplify: $4\sqrt{18x^9y^6} - 3xy\sqrt{50x^7y^4}$
- 15) Solve for x : $\sqrt{2x + 7} + 2 = x + 4$
- 16) Simplify: $(\sqrt{2x - 3})^2 - (\sqrt{2x} - 3)^2$

- 17) Use the graph of $y = f(x)$ shown below to find:
- the domain of $f(x)$
 - the range of $f(x)$
 - the value(s) of x for which $f(x) = 0$
 - $f(0)$



- 18) Rationalize and simplify: $\frac{12}{3-\sqrt{5}} - \frac{20}{\sqrt{5}}$
- 19) Determine whether each of the following is a function and in each case explain your answer.
- $\{(-2, 3), (2, 5), (3, 3), (4, 7)\}$
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- 20) Find the center and radius of the circle with the following equation:
 $x^2 + 8x + y^2 - 6y - 2 = 9$
- 21) Company A rents out computers for \$ 120 per month plus a delivery fee of \$ 31, while company B charges \$ 124 per month and a delivery fee of \$ 23.
- Write the cost of renting from each company as a function of the number of months.
 - In how many months will the cost of renting be the same from both companies?