

Question 1:

(a)[3 points] Find the slope of the line through the points $(5, -7)$ and $(-3, -1)$.

(b)[3 points] Simplify and express your answer so that all exponents are positive:

$$\frac{(x^{-1}y)^{1/3}}{(x^{2/3}y^{-2/3})^2}$$

(c)[4 points] Find the remainder when $-3x^4 + x^2 + 1$ is divided by $x^3 + x + 1$.

Question 2:

(a)[3 points] Factor completely:

$$x^2 + 4x - 21$$

(b)[3 points] Factor completely:

$$10x^2 - 13x + 3$$

(c)[4 points] Factor completely:

$$x^3 + 6x^2 - 4x - 24$$

Question 3:

(a)[3 points] Solve:

$$\frac{2x}{x-5} = 1 - 3x$$

(b)[3 points] Solve:

$$1 + \frac{2-x}{3} > 5$$

(c)[4 points] Solve:

$$\left| \frac{4x+2}{7} \right| > 2$$

Question 4:

(a)[3 points] Simplify:

$$\frac{\frac{x}{x+2}}{\frac{x-1}{x^2+x-2}}$$

(b)[3 points] Rationalize the denominator:

$$\frac{\sqrt{x}}{x + \sqrt{h}}$$

(c)[4 points] Find all points on the x -axis a distance 13 from the point $(8, 12)$.

Question 5:

(a)[3 points] Find the equation of the line through $(-4, 3)$ which is parallel to the line $y = \frac{2}{3}x - 121$.

(b)[3 points] Find the x -intercepts of $y^2 = x^3 - 4x$.

(c)[4 points] Put the circle $x^2 + 6x + y^2 - 5y = \frac{3}{4}$ into standard form and state the radius.

Question 6:

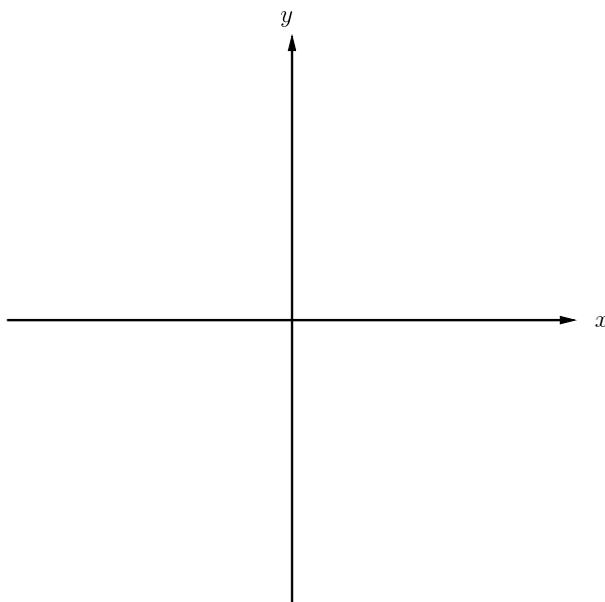
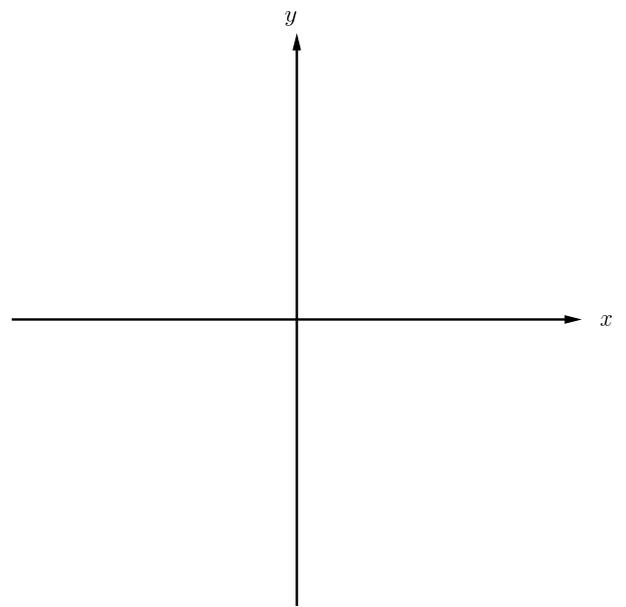
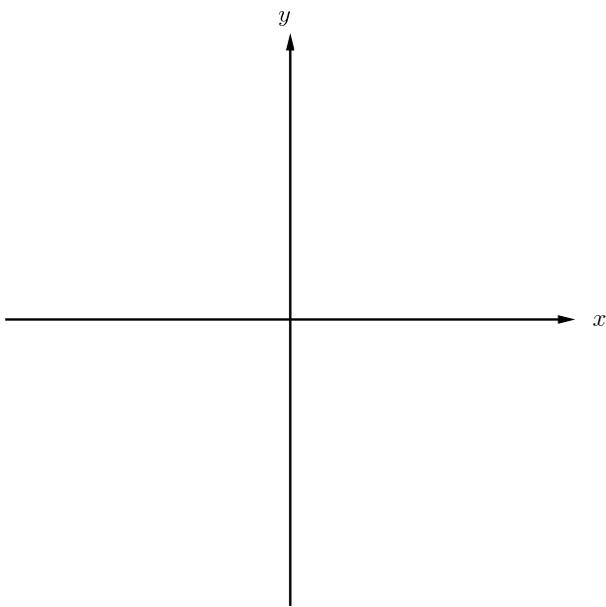
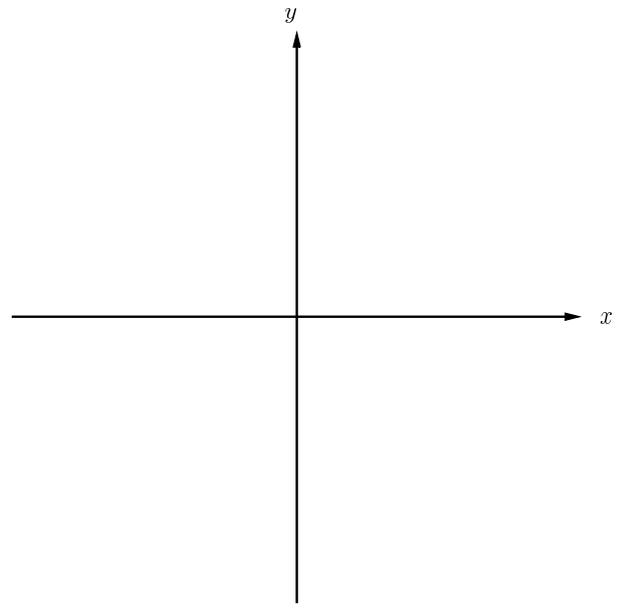
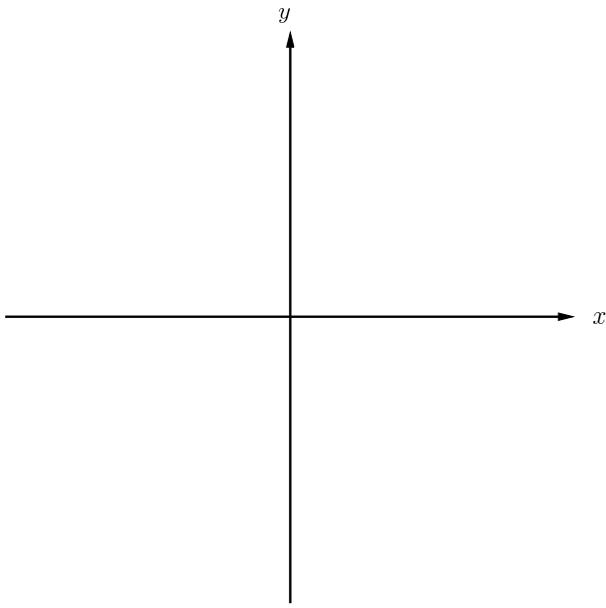
(a)[3 points] Let $f(x) = x^2 + 1$. Compute and simplify

$$\frac{f(x+h) - f(x)}{h}$$

(b)[3 points] Determine the domain of $f(x) = \frac{\sqrt{x+1}}{x^2-1}$.

(c)[4 points] Determine the vertex of $f(x) = 2x^2 + 8x - 1$.

Question 7 [10 points]: Neatly sketch the graph of the function $f(x) = -2\sqrt{x+3} + 1$ below by starting with a basic function and applying four transformations. Your final answer should appear in the last graph below. In your final graph indicate the scale on the x and y axes and label at least one point.



Question 8: The supply and demand functions for a particular product are given by

$$S(p) = -50 + 10p$$

$$D(p) = 220 - 8p$$

(a)[5 points] Determine the equilibrium price and quantity.

(b)[5 points] Since revenue is the product of price and quantity, the demand function above can be used to express revenue as a function of price: $R(p) = 220p - 8p^2$. Determine the price p which maximizes revenue.

Question 9 [10 points]: Find all zeros of the polynomial function

$$f(x) = x^4 - 3x^3 - 3x^2 + 11x - 6 .$$

Neatly show all steps in your solution and state a clear conclusion.

Question 10 [10 points]: Solve and state your answer using interval notation:

$$\frac{(4x - 7)(x + 2)}{x} \leq 0$$

Neatly show all steps in your solution and state a clear conclusion.

Question 11 [10 points]: A rectangle is inscribed in the first quadrant under the line $y = 7 - 3x$ as shown below. Determine the maximum possible area of such a rectangle.

