

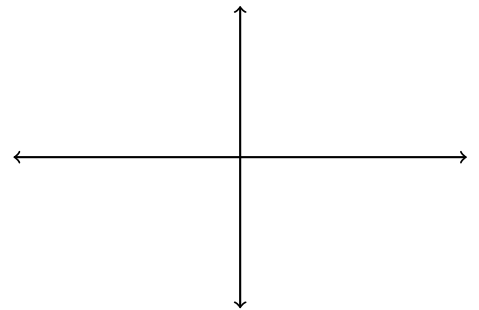
Midterm 1 Review Problems

Math 140

1. Solve $\frac{6}{x+5} + \frac{1}{2(x+5)} = 1$.

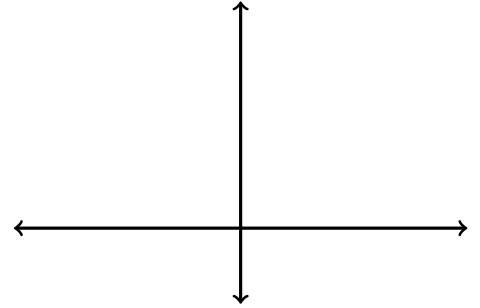
2. Simplify $\frac{30a}{5} \cdot \sqrt{\frac{b^2}{9a^6}}$

3. Factor to find all of the roots of $y = x^3 - x^2 - 12x$, and then use the axes below to sketch a graph of the function.

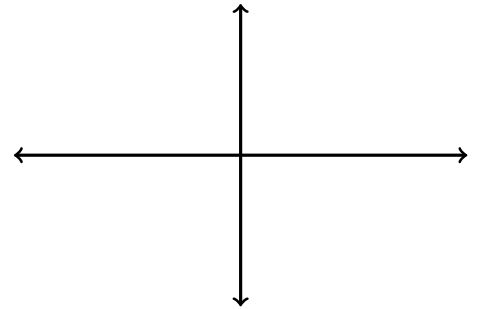


4. Find a formula for the linear function $f(x)$ with $f(-2) = 1$ and $f(4) = -2$.

5. Suppose that a ball is thrown up in the air over the head of a person standing at the origin. The ball follows a parabolic trajectory with $h(x) = -\frac{1}{2}x^2 + 4x + 10$ where h is the height of the ball above the ground and x is the horizontal position of the ball relative to the person at the origin. Draw a graph of the path the ball travels. Be sure to label the x and y -coordinates of the vertex (where the ball is highest in the air) and the x -coordinates where the ball starts and finishes its path.



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6. Graph the function $f(x) = \sqrt{x+4}$. Be sure to label any points where the function crosses the x or y -axis.



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7. Simplify by factoring $\frac{x^2 - 5x + 6}{4x - 8}$.

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8. Simplify $(\sqrt{2} + \sqrt{50})^2$.
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9. Suppose that $f(x) = 4x - 1$ and $g(x) = \frac{1}{x + 2}$. Calculate the following.

(a) $g(f(1))$

(b) $f(g(0))$

10. Doctors are testing the effectiveness of a new pain medicine. They are trying to find a function $P(d)$ to predict a patient's pain level (on a scale from 0 to 10) as a function of the dose d that the patient receives (in milligrams). If $P(5) = 7$, what does that mean about dose and pain levels? Write a complete sentence to explain.

11. Continuing the last problem. Over time, the dose remaining in a patient's body will decrease, so d is a function of time t (measured in hours). That is $d = d(t)$. Which of the following would be the right way to predict a patient's pain level 6 hours after taking a dose of pain killer? (Circle one.)

A. Calculate $d(P(6))$.

B. Solve $6 = P(d(t))$.

C. Solve $6 = d(P(t))$.

D. Calculate $P(d(6))$.

12. Simplify the following as much as possible.

(a) $(5x^3)^2x^7$

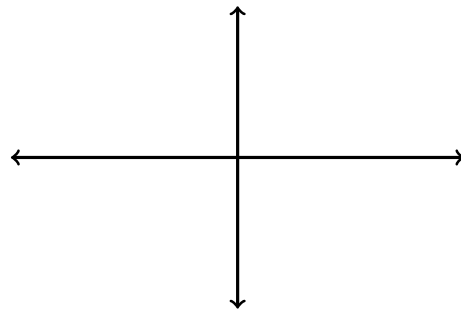
(b) $\frac{6x^{-4}}{2x^{-1}}$

13. If a gas station sets the price of gas at \$2 per gallon, they will sell 16,000 gallons of gas. Assume that the quantity of gas sold is a linear function and for every dollar the price increases, the quantity sold decreases by 4,000 gallons.

(a) Use point-slope form to write an equation for the quantity of gas sold y as a function of price p .

(b) What is the y -intercept of the function above?

14. Continuing the last problem. Revenue is price times quantity sold. Find a formula for the revenue R at this gas station as a function of price x . Then graph the revenue function and find the price where revenue is the highest.



15. Factor the equation $Ax + B^2x = 1$ and solve for x .

16. The graph of a function $y = g(x)$ is shown. Use the graph to find the following.

(a) What are the roots of $g(x)$?

(b) What is $g(2)$?

(c) What is $g(g(2))$?

