Math-1003b Practice Final Exam

1). Simplify the following expression:

$$\left(\frac{x+3}{x^2-5x+6}\right)\left(\frac{4x-8}{x^2-9}\right)$$

2). Simplify the following expression:

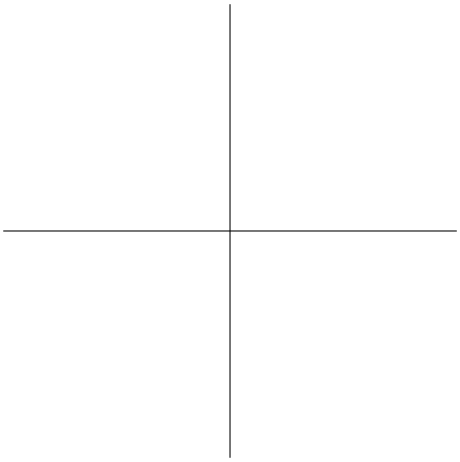
$$\frac{5}{2x}-\frac{3}{x+3}$$

3). A car completes in a NASCAR race on an oval track that measures 2 miles around. On the first lap the car is stuck in the pack, but breaks free on the second lap. The driver notices that the car is going 25 mph faster on the second lap. The car's timer measures that the car's second lap is 14.4 seconds ($\frac{1}{250}$ of an hour) faster than the first lap. What was the car's speed during the second lap?

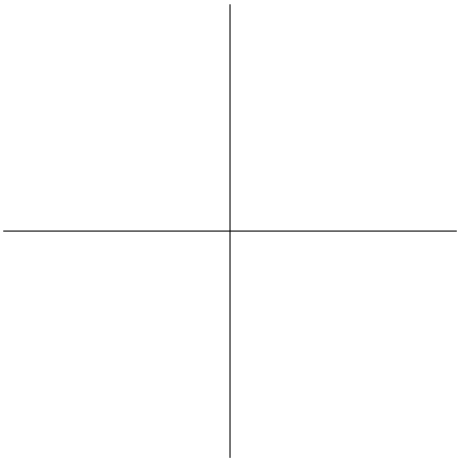
4). Let $f(x) = x^{-\frac{2}{3}} + |x| - 3$. Evaluate the function at $x = -27$.

5). Sketch (do not plot points) for the following functions:

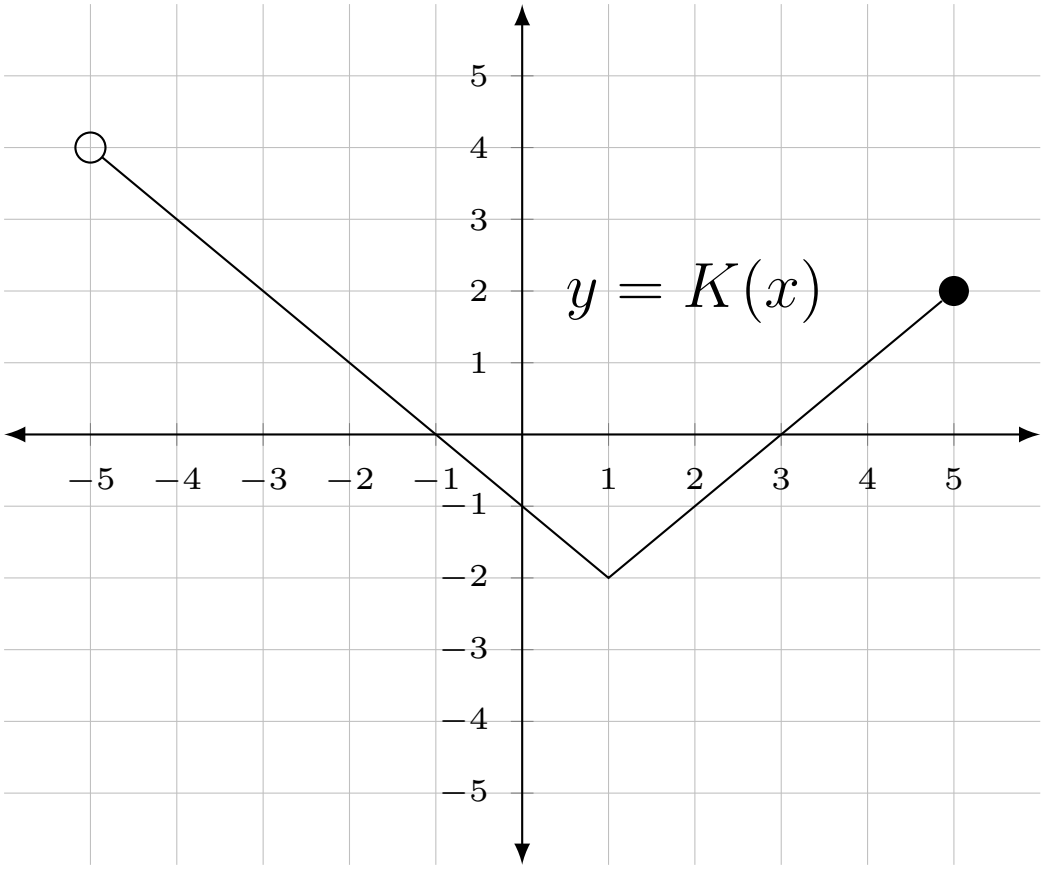
a). $f(x) = x^3$.



b). $f(x) = |x|$.



6). Use the graph of $K(x)$ to answer the following questions:



a). What is $K(1)$?

b). What is the y-intercept?

c). For what values of x is $K(x) = 0$?

d). What is the domain of K, in interval notation?

e). What is the range of K, in interval notation?

7). Let $f(x) = x^2 + 1$ and $g(x) = x - 3$. Perform the following operations:

a). $f + g$

b). fg

c). $\frac{f}{g}$

d). $f \circ g$

e). $g \circ f$

8). The area of a picture projected on a wall varies directly as the square of the distance from the projector to the wall. If a 5 foot distance produces a picture with an area of 50 squarefeet, then what is the area of a picture produced with the projection unit is moved to a distance 10 feet from the wall?

9). Solve the following inequalities. Your answers must be in interval notation:

a). $-3 < 2x - 1 \leq 3$

b). $2x - 1 \leq -3$ or $2x - 1 > 3$

10). Solve the following inequalities. Your answers must be in interval notation:

a). $x^2 - 2x - 8 > 0$

b). $\frac{x+2}{x-4} \leq 0$

11). Solve for x:

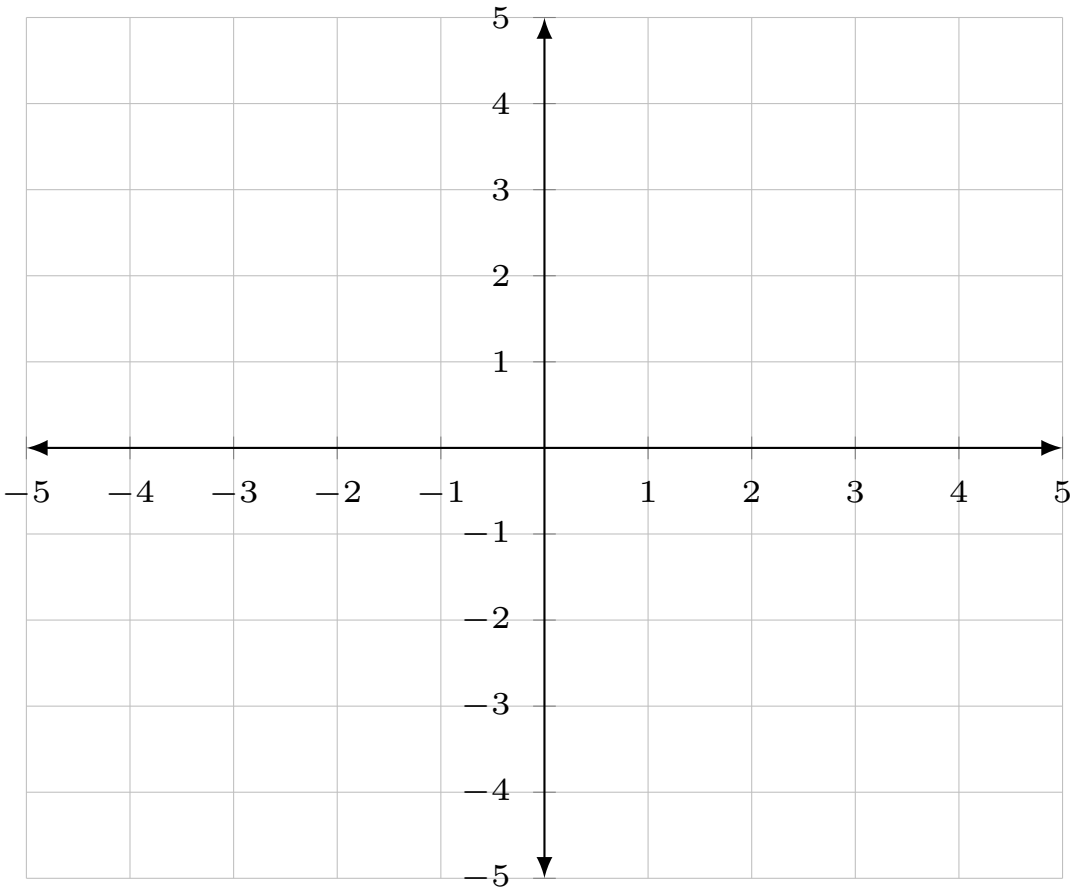
a). $\left|\frac{1}{3}x + 2\right| - 1 = 3$

b). $\left|\frac{1}{3}x + 2\right| - 1 < 3$

c). $\left|\frac{1}{3}x + 2\right| - 1 \geq 3$

12). Solve the following system of inequalities graphically. For full credit, determine and label the x and y intercepts for each line, sketch the two lines using the intercepts, and then select the correct region.

$$\begin{cases} x + y < 1 \\ 3x - 2y \geq 6 \end{cases}$$



13). Simplify (assume all variables are nonnegative):

$$\left(\frac{54x^{-2}y^2}{2x^4y^{-4}}\right)^{\frac{1}{3}}$$

14). Evaluate each of the following. If not possible, say "not a real number":

a). $81^{\frac{5}{4}}$

b). $-81^{\frac{5}{4}}$

c). $(-81)^{\frac{5}{4}}$

d). $-81^{-\frac{5}{4}}$

e). $\sqrt[4]{81^5}$

15). Simplify:

$$4b\sqrt{32b^3} - \sqrt{8b^5}$$

16). Rationalize the denominators of the following:

a).

$$\frac{xy}{\sqrt[3]{xy^2}}$$

b).

$$\frac{3}{\sqrt{x}-4}$$

17). Solve the following for x:

$$\sqrt{3x+3}-1=x$$

For problems $18-20$, consider the following general form of a parabola:

$$y=2x^2+3x-5$$

18). Find the x-intercepts by completing the square.

19). Find the x-intercepts using the quadratic formula.

20). Convert to standard form by completing the square, note the x-intercepts from the previous problem, find the y intercept and the vertex, and then sketch the graph. The intercepts and vertex MUST be labeled on your sketch for full credit!