1. (17 pts) Consider the function \( f(x) \) given by the following graph of \( y = f(x) \).

![Graph of function](image)

(a) (3 pts) Evaluate \( f(1) \).

\[
\begin{align*}
    f(1) &= 2
\end{align*}
\]

(b) (3 pts) Does \( f(x) \) have an inverse function? Why or why not?

Yes. It passes the horizontal line test.

(c) (3 pts) What are the interval(s) where \( f(x) \) is decreasing?

none

(d) (3 pts) Which symmetries does the graph \( y = f(x) \) satisfy? \( y \)-axis symmetry? \( x \)-axis symmetry? Origin symmetry? Note: This is a hand-drawn graph, so it cannot be perfect. If it seems very close to having a given symmetry, then it does have that symmetry for the purpose of this test.

No Symmetry.
(e) (5 pts) On the axes provided, sketch the graph of $y = -f(x - 2)$. (The other axes at the bottom of the page may be used for practice or intermediate steps.)

Answer:

Extra $xy$ axes for practice:
2. (10 pts) Consider

\[ F(x) = \frac{2x - 2}{x + 3} \]

(a) (4 pts) On the axes provide the intercepts.

(b) (5 pts) Compute \( F^{-1}(x) \). Show your work.

\[ y = F(x) = \frac{2x - 2}{x + 3} \]

Switch \( x, y \):

\[ x = \frac{2y - 2}{y + 3} \]

Solve for \( y \):

\[ x(y + 3) = 2y - 2 \]
\[ xy + 3x = 2y - 2 \]
\[ xy - 2y = -3x - 2 \]
\[ (x - 2)y = -3x - 2 \]
\[ y = \frac{-3x - 2}{x - 2} = F^{-1}(x) \]

(b) (5 pts) Compute \((F \circ F)(1)\). Show your work. You may express your answer either as a fraction or as a decimal number.

\[ (F \circ F)(1) = F(F(1)) = F\left( \frac{2(1) - 2}{1 + 3} \right) = F(0) \]
\[ = \frac{2(0) - 2}{0 + 3} = -\frac{2}{3} \]
3. (16 pts)

(a) (4 pts) On the axes provided, sketch the graph of \( y = x^2 \). Clearly label the intercepts.

(b) (4 pts) On the axes provided, sketch the graph of \( y = x - 2 \). Clearly label the intercepts.

\[
\begin{align*}
\text{X- and Y-intercepts at (0,0)} \\
\text{Y-intercept:} \\
&x = 0, \ y = 0 - 2 = -2 \\
&(0, -2) \\
\text{X-intercept:} \\
&y = 0 \\
&y = x - 2 = 0 \\
&x = 2 \\
&(2, 0)
\end{align*}
\]
(c) (4 pts) On the axes provided, sketch the graph of

\[ y = g(x) = \begin{cases} 
  x^2 & \text{for } x \geq 0 \\
  x - 2 & \text{for } x < -1.
\end{cases} \]

(d) (4 pts) Find the domain and the range of the function \( g(x) \) defined above. Put your answers in the boxes provided and in interval notation.

**Domain:** 
\[ \left( -\infty, -1 \right) \cup \left[ 0, \infty \right) \]

**Range:** 
\[ \left( -\infty, -3 \right) \cup \left[ 0, \infty \right) \]

\( g(x) \) defined if \( x \geq 0 \) \([0, \infty)\) or if \( x < -1 \), \((-\infty, -1)\)

Graph above, project to y-axis to find range.

There are 2 pieces: \((-\infty, -3)\), \([0, \infty)\)