Sols

Math 122: Function Transformations

Parent Function Repertoire

$f(x) = x$ $\qquad$ $f(x) = x^2$ $\qquad$ $f(x) = x^3$ $\qquad$ $f(x) = x^4$ $\qquad$ $f(x) = \frac{1}{x}$ $\qquad$ $f(x) = \frac{1}{x^2}$

$f(x) = e^x$ $\qquad$ $f(x) = \ln(x)$ $\qquad\qquad$ $f(x) = |x|$ $\qquad$ $f(x) = \sqrt{x}$ $\qquad$ $f(x) = \sqrt[3]{x}$

**1.** $f(x) = 2(x-3) + 1$

$y = x - 3$
$y = 2(x-3)$
$f(x)$

Parent function: $f(x) = x$
Transformations:
  Horizontal Shift right 3 units
  Vertical stretch by a factor of 2
  Vertical shift up 1 unit

**2.** $f(x) = -e^{x+1} + 1$

$y = e^{x+1}$
$f(x)$
$y = -e^{x+1}$

Parent function: $f(x) = e^x$
Transformations:
  Horizontal shift left 1 unit
  Reflection over the x-axis
  Vertical shift up 1 unit
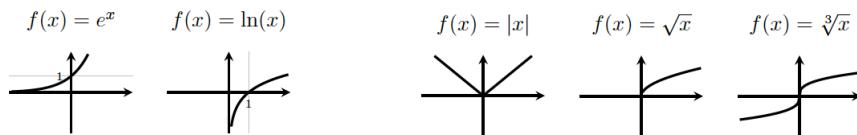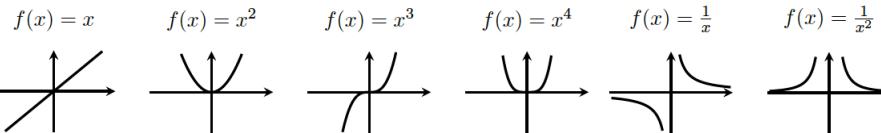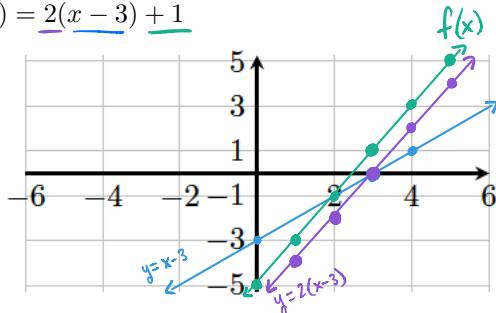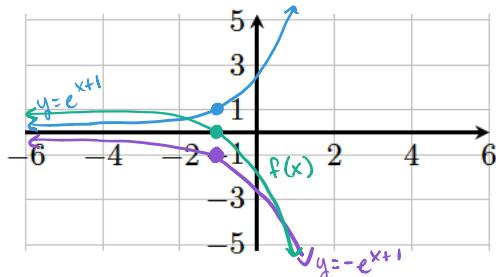
3. $f(x) = \sqrt[3]{1-x} + 2 = \sqrt[3]{-(x-1)} + 2 = -\sqrt[3]{x-1} + 2$ Since $\sqrt[3]{-1} = -1$.

$y = \sqrt[3]{x-1}$
$f(x)$
$y = -\sqrt[3]{x-1}$

Parent function: $f(x) = \sqrt[3]{x}$
Transformations:
 Horizontal shift right 1 unit
  Reflection over x-axis
  Vertical shift up 2 units
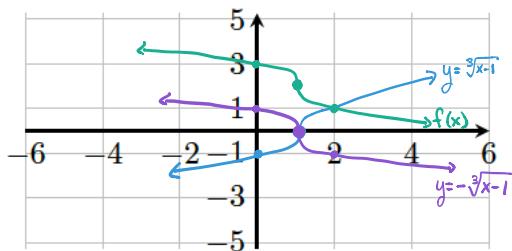
4. $f(x) = -(x-2)^3 - 1$
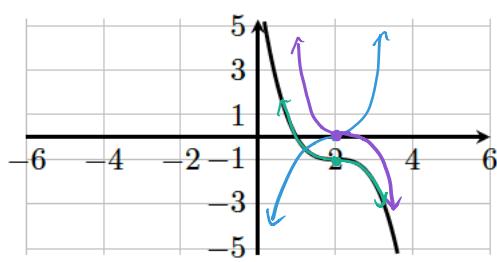
Parent function: $f(x) = x^3$
Transformations:
 Horizontal shift right 2 units
 Reflection over x-axis
 Vertical shift down 1 unit

5. $f(x) = -\dfrac{1}{x-1} - 1$
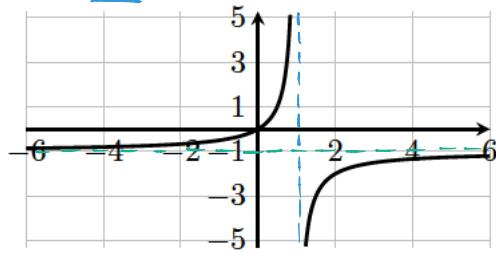
Parent function: $f(x) = \dfrac{1}{x}$
Transformations:
 Horizontal shift right 1 unit
 Reflection across x-axis
 Vertical shift down 1 unit

6. $f(x) = -\ln(x+2)$
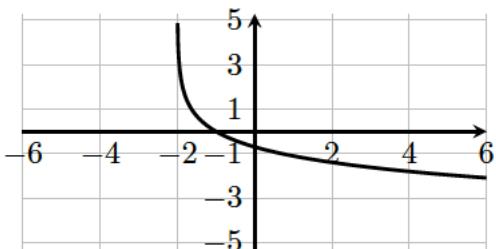
Parent function: $f(x) = \ln(x)$
Transformations:
 Horizontal shift left 2 units
 Reflection over x-axis