Unit 7 4.2 Exponential Functions

$$f(x) = a^x \qquad a > 0,\ a \neq 1$$

Ex 1 Evaluate Exponential Function, $f(x) = 2^x$

(a) $f(-1) = 2^{-1} = \boxed{\frac{1}{2}}$

(b) $f(3) = 2^3 = 2 \cdot 2 \cdot 2 = \boxed{8}$

(c) $f\left(\frac{5}{2}\right) = 2^{\frac{5}{2}} = \left(2^5\right)^{\frac{1}{2}} = 32^{\frac{1}{2}}$

$= \sqrt{32} = \boxed{4\sqrt{2}}$

(2) 16

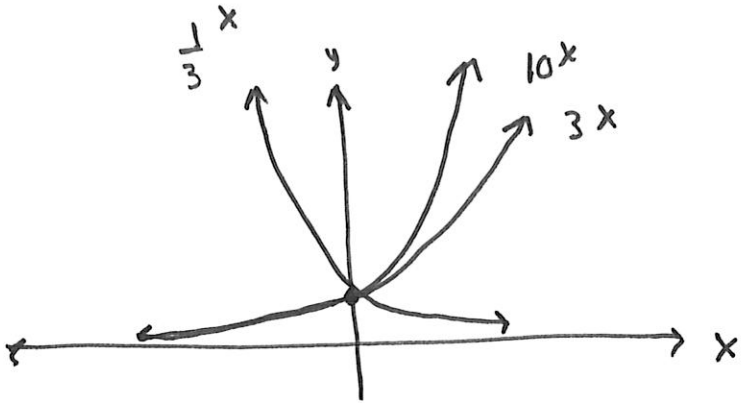
(4)(4)

(d) $f(4.92) = 2^{4.92} \approx \boxed{30.274}$

13, 19, 23

4.2 Characteristics of Graph of $f(x) = a^x$

Day 1 (2)



(1) If $a > 1$, f is increasing

(2) If $0 < a < 1$, f is decreasing

(3) x-axis is horizontal asymptote

(4) Domain $(-\infty, \infty)$ Range $(0, \infty)$

(5)

$f(x) = 2^x$

-1	$2^{-1} = \frac{1}{2}$
0	$2^0 = 1$
1	$2^1 = 2$

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

-1	$\frac{1}{2}^{-1} = 2$
0	$\frac{1}{2}^0 = 1$
1	$\frac{1}{2}^1 = \frac{1}{2}$

(5)

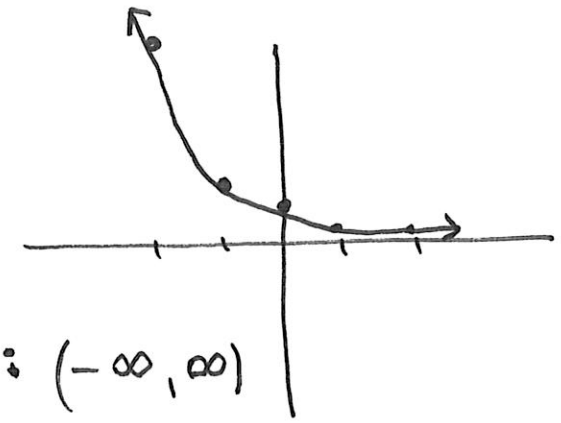
$(-1, \frac{1}{a})$

$(0, 1)$

$(1, a)$

Ex 2 Graph $f(x) = \left(\frac{1}{5}\right)^x$ Domain Range

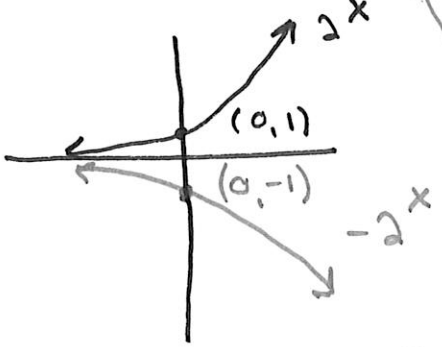
x	$\left(\frac{1}{5}\right)^x$
-2	$\left(\frac{1}{5}\right)^{-2} = 5^2 = 25$
-1	$\left(\frac{1}{5}\right)^{-1} = 5$
0	$\frac{1}{5}^0 = 1$
1	$\frac{1}{5}^1 = \frac{1}{5}$
2	$\left(\frac{1}{5}\right)^2 = \frac{1}{25}$



D: $(-\infty, \infty)$

R: $(0, \infty)$

Ex 3 (a) $f(x) = -2^x$ parent function $f(x) = 2^x$

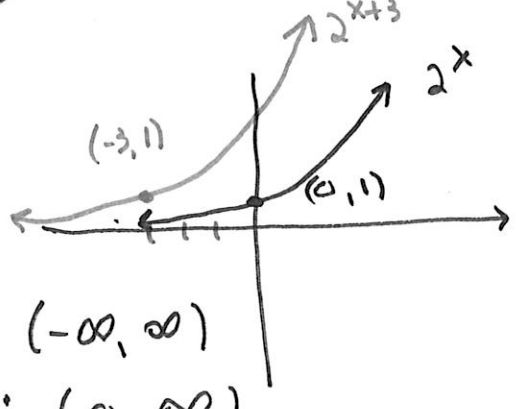


reflect over x-axis

D: $(-\infty, \infty)$

R: $(-\infty, 0)$

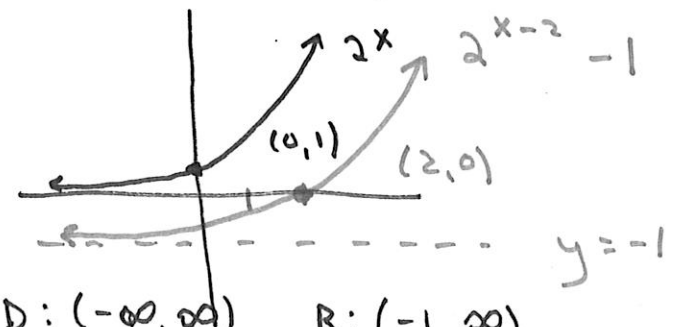
(b) $f(x) = 2^{x+3}$ ← Left 3



D: $(-\infty, \infty)$

R: $(0, \infty)$

(c) $f(x) = 2^{x-2} - 1$ ← Down 1, ↑ Right 2



D: $(-\infty, \infty)$ R: $(-1, \infty)$