

#15

DOMAIN
IR

RANGE
IR

#16

DOMAIN
[2, 8]

RANGE
[-1, 1]

MAX AT (8, +1)

MIN AT (2, -1)

#17

DOMAIN
IR

RANGE
(-∞, 1]

MAX AT (0, 1)

#18

DOMAIN
IR

RANGE
[-1, ∞)

MIN AT (1, -1)

#19) $\frac{\text{DOMAIN}}{\mathbb{R}}$ $\frac{\text{RANGE}}{[-3, \infty)}$
MIN AT $(3, -3)$

#20) $\frac{\text{DOMAIN}}{\mathbb{R}}$ $\frac{\text{RANGE}}{(-\infty, 11)}$
MAX AT $(-2, 11)$

#21) $\frac{\text{DOMAIN}}{[0, \infty)}$ $\frac{\text{RANGE}}{(-\infty, 1]}$
MAX AT $(0, 1)$

#22) $\frac{\text{DOMAIN}}{\mathbb{R}}$ $\frac{\text{RANGE}}{(-\infty, 0]}$
MAX AT $(0, 0)$

#23) $\frac{\text{DOMAIN}}{\mathbb{R}}$ $\frac{\text{RANGE}}{\mathbb{R}}$

#24) DOMAIN RANGE
[-3, ∞) [0, ∞)
MIN AT (-3, 0)

#25) DOMAIN RANGE
IR IR

#26) DOMAIN RANGE
IR IR

USE CALCULUS TO
FIND MAX AND MIN

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

$$y' = 3x^2 - 6x$$

WHEN IS $y' = 0$?

$$0 = 3x^2 - 6x$$

$$0 = 3x(x - 2)$$

$$x = 0 \quad \text{OR} \quad x = 2$$

MAX AT (0, 0)

MIN AT (2, -4)

#27

DOMAIN

IR EXCEPT $x=0$

RANGE

$(0, \infty)$

VA AT $x=0$

HA AT $y=0$

DISCONTINUITY AT $x=0$

#28

DOMAIN

IR EXCEPT $x=3$

RANGE

$(0, \infty)$

VA AT $x=3$

HA AT $y=0$

DISCONTINUITY AT $x=3$

#29

DOMAIN

IR

RANGE

$[1, \infty)$

#30

DOMAIN

IR

RANGE

$(-1, \infty)$

DISCONTINUITY
AT $x=0$

#31) DOMAIN RANGE
IR IR

MAX AT $(-2, 4)$

MIN AT $(0, 0)$

#32) DOMAIN RANGE
IR $[0, \infty)$

DISCONTINUITY
AT $x = 2$

MIN AT $(0, 0)$