Test 2 Review

Wednesday, February 27, 2019 1:02 PM

MC

① Slope $= \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{3 - 1}{\frac{4}{5} - 3} = \dfrac{2}{-\frac{11}{5}} = \boxed{-\dfrac{10}{11}}$

②

$12x - 11y - 132 = 0$

→ Slope-intercept form → y by itself

$-11y = -12x + 132$

$y = \boxed{\dfrac{12}{11}}x - 12$

Slope $= m = \dfrac{12}{11}$ y-intercept $(0, -12)$

③ Line L perpendicular to $y = \frac{1}{3}x + 3$.

Slope of L $= -3$ (negative reciprocal)

Point $(5, 2)$

Point-Slope Equation: $y - 2 = -3(x - 5)$

→ $y - 2 = -3x + 15$

→ $\boxed{y = -3x + 17}$

(4) $\boxed{y = x^2} \longrightarrow \boxed{f(x) = \boxed{0.6}(\boxed{x+7})^2 - 3}$

parent function

Transformed Function

Left : 7 units

Shrink vertically : by a factor of 0.6

Down : 3 units

(5) $g(x) = f(\boxed{x-1}) + 3$

Point $(4, 13)$ is on graph of $y = f(x)$

Right : 1 unit

Up : 3 units.

$\underbrace{(4, 13)}_{\text{on } f} \xrightarrow[\text{1 unit}]{\text{Right}} (5, 13) \xrightarrow[\text{3 units}]{\text{Up}} \underbrace{\boxed{(5, 16)}}_{\text{on } g}$

(6) $\boxed{y = x^3} \xrightarrow[\text{5.3 units}]{\text{Right}} \xrightarrow[\text{Factor of 0.6}]{\text{Shrink vertically}} \boxed{?}$

parent function

$(x - 5.3)^3 \longrightarrow \boxed{0.6(x - 5.3)^3}$

(Transformed function)

(7)

$$g(x) = \begin{cases} \dfrac{x^2+8}{x-3} & \text{if } x \neq 3 \\ x+6 & \text{if } x = 3 \end{cases}$$

$$g(\boxed{7}) = \frac{(7)^2+8}{7-3} = \boxed{\frac{57}{4}}$$

different from 3

↓

use first formula

(8) $x \leq 0$: Parabola $\rightarrow y = x^2$

$x > 0$: Absolute Value function shifted 2 units to right and reflected across x-axis

$\rightarrow y = -|x-2|$

So, $\boxed{f(x) = \begin{cases} x^2 & \text{if } x \leq 0 \\ -|x-2| & \text{if } x > 0 \end{cases}}$

(9) $h(x) = \frac{1}{2}x^2 - 4x - \frac{5}{2}$. Vertex ?

Vertex formula : $x_{\text{vertex}} = h = -\frac{b}{2a}$

$y_{\text{vertex}} = k = f(h)$

$$x_{\text{vertex}} = -\frac{(-4)}{2\cdot\frac{1}{2}} = 4$$

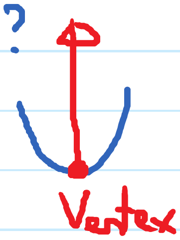
$$y_{\text{vertex}} = f(4) = \frac{1}{2}(4)^2 - 4\cdot(4) - \frac{5}{2}$$

$$= -\frac{21}{2}$$

Vertex : $\boxed{\left(4, -\frac{21}{2}\right)}$

10 $f(x) = 3x^2 + 12x + 17$. Range = ?

$a = 3 > 0 \to$ parabola opens up



Range $= [k, \infty)$

$$h = -\frac{b}{2a} = -\frac{12}{2\cdot(3)} = -2$$

$$k = f(h) = 3\cdot(-2)^2 + 12(-2) + 17 = 5$$

$\boxed{\text{Range} = [5, \infty)}$

11 $f(x) = \underbrace{(x-2)}_{x} \cdot \underbrace{(x+1)}_{x} \cdot \underbrace{(x+2)^3}_{x^3} = 1\cdot x^{\boxed{5}}$

degree: odd

leading coeff. positive

End Behavior: Falls Left

Rises Right.

(12) $f(x)=\frac{1}{2}x^2(x^2-5)(x-3)$

$$0=\frac{1}{2}x^2(x-\sqrt{5})(x+\sqrt{5})(x-3)$$

$\frac{1}{2}x^2=0$; $x-\sqrt{5}=0$; $x+\sqrt{5}=0$; $x-3=0$

$x=0$ $\quad x=\sqrt{5}$ $\quad x=-\sqrt{5}$ $\quad x=3$

Mult. = 2 $\quad$ Mult. = 1 $\quad$ Mult. = 1 $\quad$ Mult. = 1

S.A.

(13)

$$f(x)=\begin{cases}7x+1 & \text{for } x<6\\ 6x & \text{for } 6\le x\le 10\\ 6-3x & \text{for } x>10\end{cases}$$

$$f(\boxed{-6})=7\cdot(-6)+1=\boxed{-41}$$

$<6 \to 1^{st}$ formula

(14) $f(x)=\frac{1}{2}x^2-8x-\frac{11}{2}$

$a=\frac{1}{2}>0 \to$ parabola opens up $\to$ there is a minimum. Min Value $= y_{vertex} = k$.

$$h = -\frac{b}{2a} = -\frac{(-8)}{2\cdot\left(\frac{1}{2}\right)} = 8$$

$$k = f(h) = \frac{1}{2}(8)^2 - 8\cdot 8 - \frac{11}{2}$$

$$= -\frac{75}{2}$$

So, $\boxed{\text{min value} = -\frac{75}{2}}$

(15) $f(x) = x^3 + x^2 - 42x$.

Find zeros: Set $f(x) = 0$.

$$0 = x^3 + x^2 - 42x$$

$$0 = x(x^2 + x - 42)$$

$$0 = x(x+7)(x-6)$$

	$x = 0$;	$x = -7$;	$x = 6$
Mult.	1	1	1
	cross	cross	cross.

16 Slope $= \dfrac{-6-(-5)}{-6-(-2)} = \dfrac{-1}{-4} = \dfrac{1}{4}$

Point-Slope formula: $y - y_1 = m(x - x_1)$

$$y-(-5) = \frac{1}{4}(x-(-2))$$

$$y+5 = \frac{1}{4}(x+2)$$

$$y+5 = \frac{1}{4}x + \frac{1}{2}$$

$$\boxed{y = \frac{1}{4}x - \frac{9}{2}}$$

17 Graph on left $\xrightarrow[\text{2 units}]{\text{Right}}$ Graph on right

Equation: $f(x) = -\boxed{x}^3 + 3\boxed{x} \longrightarrow \underbrace{-(x-2)^3 + 3(x-2)}_{g(x)}$

Replace by $x-2$

Ans: $\boxed{g(x) = -(x-2)^3 + 3(x-2)}$

18 Alcohol level when $x = 4$ hours is:

$$A(4) = -0.015(4)^3 + 1.05\cdot(4)$$

$$= 3.24 > 1.5 \rightarrow \text{Drunk}$$

Essay.

19 $9x + y - 5 = 0$

$$y = \boxed{-9}x + 5 \rightarrow \text{Slope} = -9.$$

Since L is parallel to $9x + y - 5 = 0$, the slope of L must be -5 as well.

Point: $(5,2)$.

Point slope equation: $y - 2 = -9(x-5)$

$$y - 2 = -9x + 45$$

$$\boxed{y = -9x + 47}$$

20 $C(x) = 2x^2 - 32x + 730 \rightarrow$ Quadratic

Lowest cost = Min Value of the function C

$$= y_{vertex} = k$$

minimum cost

$$h = -\frac{b}{2a} = -\frac{(-32)}{2 \cdot 2} = 8.$$

$$k = f(8) = 2 \cdot (8)^2 - 32 \cdot (8) + 730 = \boxed{602}$$