Pre-Calculus Honors Name: Key!!

Unit 2 Functions Test Review

1. Determine if the following functions are even, odd, or neither.

a) $f(x) = x^3 - 4x$ odd

b) $f(x) = x^5 + 7x^2 - 3x + 5$ neither

c) $f(x) = \frac{1}{x^4+6}$ even

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

2. Find the Domain, Range, and Asymptote(s) for the following functions:

a) $f(x) = \frac{1}{x+3}$ H.A.: $y=0$ R: $(-\infty,0)\cup(0,\infty)$ V.A.: $x=-3$ D: $(-\infty,-3)\cup(-3,\infty)$

b) $f(x) = \frac{2x^1}{x^4+3}$ H.A.: $y=2$ R: $(-\infty,2)\cup(2,\infty)$ V.A.: $x=-3$ D: $(-\infty,-3)\cup(-3,\infty)$

3. State the end behavior and boundedness for the following:

a) $f(x) = x^3 - 5x$ Left: $\lim_{x\to-\infty} f(x) = -\infty$ Right: $\lim_{x\to\infty} f(x) = \infty$ NOT bounded

H.A.: $y=2$ b) $f(x) = \frac{(2x^2-9)}{(x^2-9)}$ Left: $\lim_{x\to-\infty} f(x) = 2$ Right: $\lim_{x\to\infty} f(x) = 2$ NOT bounded

4. Find the extrema and state the intervals of increasing/decreasing for the function $f(x) = x^4 - 2x^2 - 8$

extrema: Rel. Max: $(0,-8)$, Abs. Min.: $(-1,-9)$ & $(1,-9)$

inc.: $(-1,0)\cup(1,\infty)$

dec.: $(-\infty,-1)\cup(0,1)$

5. Find the composites for the following:

If $f(x) = -4x+2$ and $g(x) = \sqrt{x-8}$, find $(f\circ g)(12) = f(g(12))$ (outside, inside)

$g(12) = \sqrt{12-8} = \sqrt{4} = 2$

$f(2) = -4(2)+2 = -8+2 = -6$

Given $f(x) = 2x-5$ and $g(x) = x+2$, find $(f\circ g)(x) = f(g(x))$ (outside, inside)

$f(x+2) = 2(x+2) - 5$

$= 2x+4-5$

$= 2x-1$

If $f(x) = -2x+1$ and $g(x) = \sqrt{x^2-5}$, find $(g\circ f)(2) = g(f(2))$ (outside, inside)

$g(-3) = \sqrt{(-3)^2-5}$

$= \sqrt{9-5} = \sqrt{4} = 2$

$f(2) = -2(2)+1 = -4+1 = -3$

Given $f(x) = 4x+3$ and $g(x) = x^2$, find $(g\circ f)(x) = g(f(x))$ (outside, inside)

$g(4x+3) = (4x+3)^2$

$= 16x^2+24x+9$

FOIL or BOX!

6.

**For each function $h$ given below, decompose $h$ into the composition of two functions $f$ and $g$ so that $h = f \circ g$.** $f(x)$: outside $g(x)$ = inside

(a) $h(x) = (x+5)^2$ $f(x) = x^2$ $g(x) = x+5$

(b) $h(x) = \sqrt[3]{5x^2+1}$ $f(x) = \sqrt[3]{x}$ $g(x) = 5x^2+1$

(c) $h(x) = 2^{\cos x}$ $f(x) = 2^x$ $g(x) = \cos x$

(d) $h(x) = \cos(2^x)$ $f(x) = \cos x$ $g(x) = 2^x$

(e) $h(x) = \dfrac{\sqrt{x^2+1}-1}{\sqrt{x^2+1}+1}$ $f(x) = \dfrac{\sqrt{x}-1}{\sqrt{x}+1}$ $g(x) = x^2+1$

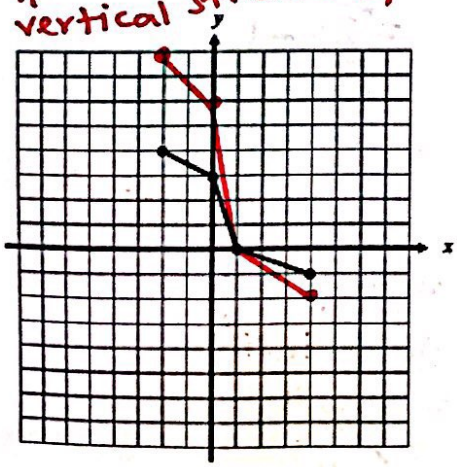
7.

**Describe the transformations that affect the function $f(x)$.**

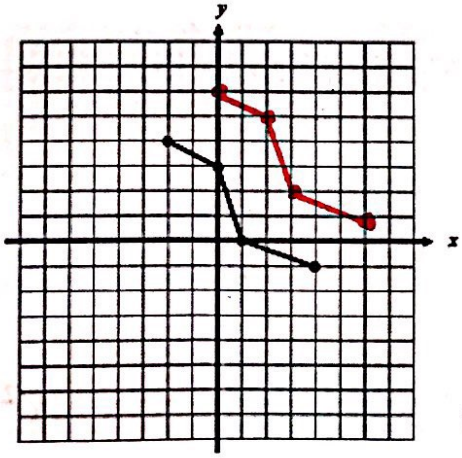
| | | |
|---|---|---|
| 1. $y = f(x)+2$ <br> up 2 | 2. $y = -f(x)$ <br> Reflect over x-axis | 3. $y = f(x-2)$ <br> Right 2 |
| 4. $y = f(x+3)$ <br> Left 3 | 5. $y = 5f(x)$ <br> Vertical stretch by 5 | 6. $y = f(-x)$ <br> Reflect over y-axis |

Graph the Transformations

8. 2f(x) — vertical stretch by 2




9. f(x−2)+2 — Right 2, up 2




10. −f(x) — reflect over x-axis