AP Calculus
Quiz 1
Sections P.1-P.4

Name: Key - Kortven

8 pts

2pts 1. Show that $y = \frac{x}{x^2+1}$ is symmetric with respect to the origin. (Show it is an odd function.)

$-y = \frac{-x}{(-x)^2+1}$

$(-1)(-y) = \left(\frac{-x}{x^2+1}\right)-1$

$y = \frac{x}{x^2+1}$

$y(x) = -y(-x)$

1 substitute $-y$ and $-x$

1 shows $-y(-x) = y(x)$

4pts 2. Find the intercepts of $y = \frac{2x-1}{x-3}$.

$y(0) = \frac{2(0)-1}{0-3}$

$y(0) = \frac{-1}{-3}$

$0 = \frac{2x-1}{x-3}$

$+1 \quad +1$

$\frac{1}{2} = \frac{2x}{2}$

1 substitute $x=0$

1 $y = 1/3$

1 set $0 = f(x)$

1 $x = 1/2$

1

Intercepts $\boxed{y(0) = \frac{1}{3}}$ and $\boxed{x = \frac{1}{2}}$ so $(\frac{1}{2}, 0)$

3pts 3. Find all points of intersection between $y = -x^2 + 4x + 1$ and $y = x^2$

1 $x = 1 \pm \frac{\sqrt{6}}{2}$

1 - $(2.2247, 4.9494)$

1 - $(-0.2247, 0.0505)$

$x^2 = -x^2 + 4x + 1$

$+x^2 - 4x - 1 \quad +x^2 - 4x - 1$

$2x^2 - 4x - 1 = 0$

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-1)}}{2(2)}$

$x = \frac{4 \pm \sqrt{16+8}}{4}$

$x = \frac{4 \pm 2\sqrt{6}}{4}$ $\boxed{x = 1 \pm \frac{\sqrt{6}}{2}}$

so

2pts 4. If $f(x) = \frac{1}{\sqrt{x}}$ and $g(x) = x^2 - 5$ find $g(f(x))$.

1 →

$g(f(x)) = \left(\frac{1}{\sqrt{x}}\right)^2 - 5$

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

1 → $g(f(x)) = \frac{1}{x} - 5$

3pts 5. Find the domain and range of $f(x) = \frac{1}{x^2 - 2x - 2}$

1 find $0 = x^2 - 2x - 2$

1 Domain: $(-\infty, 1-\sqrt{3})$ and $(1-\sqrt{3}, 1+\sqrt{3})$ and $(1+\sqrt{3}, \infty)$

1 Range: $(-\infty, -\frac{1}{3})$ and $(0, \infty)$

$x^2 - 2x - 2 = 0$

$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-2)}}{2(1)}$

$x = \frac{2 \pm \sqrt{4+8}}{2}$

$\boxed{x = 1 \pm \sqrt{3}}$

-0.732

2.732

3pts 6. If $f(x) = \sqrt{x}$ describe in words the transformations that occurred to result in the new function $g(x) = \frac{1}{3}\sqrt{x-4} + 2$.

Compression ×3

vertical ~~stretch~~ of $\frac{1}{3}$, shift right 4 and up 2.

1 1 1

17 pts