

Rational expressions

- d. $\frac{xy}{y-x}$
 e. $\frac{xy}{x-y}$

SAT subject test

1. $\frac{[(n-1)!]^2}{[n!]^2} = \frac{(n-1)! (n-1)!}{n! n!} = \frac{1}{n^2}$
- a. $\frac{1}{n}$
 b. $\frac{1}{n^2}$
 c. $\frac{n-1}{n}$
 d. $\left(\frac{n-1}{n}\right)^2$
 e. $(n-1)^2$

5. Of the following expressions the one equal to $\frac{a^{-1}b^{-1}}{a^{-3}-b^{-3}}$ is:

- a. $\frac{a^2b^2}{b^2-a^2}$
 b. $\frac{a^2b^2}{b^3-a^3}$
 c. $\frac{b^3-a^3}{ab}$
 d. $\frac{a^3-b^3}{a^3-b^3}$
 e. $\frac{ab}{a-b}$

$$\left(\frac{1}{ab}\right) a^3 b^3 = \left(\frac{1}{a^3} - \frac{1}{b^3}\right) a^3 b^3 = \frac{a^3 b^3}{b^3 - a^3}$$

2. Under which of the following condition

is $\frac{a-b}{ab}$ positive?

- a. $0 < a < b$
 b. $a < b < 0$
 c. $b < a < 0$
 d. $b < 0 < a$
 e. None of the above

if $ab > 0$,
 $\frac{a-b}{ab} > 0$
 ① $0 < b < a$
 ② $b < a < 0$
 if $ab < 0$
 $\frac{1}{b} - \frac{1}{a} > 0$
 $\frac{1}{b} > \frac{1}{a}$
 ③ $a < 0 < b$

6. Simplify

$$3 + \frac{1}{3 + \frac{1}{3 + \frac{1}{3 + \dots}}} = x$$

3. What is the domain of the function f defined by $f(x) = \frac{x^2}{x^2+1}$?

- a. $-1 < x \leq 1$
 b. $0 \leq x < 1$
 c. $x \geq 0$
 d. All real numbers except -1
 e. All real numbers

$$3 + \frac{1}{x} = x$$

$$x^2 - 3x - 1 = 0$$

$$x = \frac{3}{2} + \frac{\sqrt{13}}{2}$$

7. Simplify

$$1 + \frac{3}{2 + \frac{3}{1 + \frac{3}{2 + \frac{3}{1 + \dots}}}} = x$$

Math Competitions

4. If $\frac{1}{x} - \frac{1}{y} = \frac{1}{z}$, then z equals:

- a. $y-x$
 b. $x-y$
 c. $\frac{y-x}{xy}$

$$\frac{y-x}{xy} = \frac{1}{z}$$

$$\frac{xy}{y-x} = z$$

$$1 + \frac{3}{2 + \frac{3}{x}} = x$$

$$\frac{x(3)}{2 + \frac{3}{x}} = x-1$$

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

$$x = \frac{1}{2} + \frac{\sqrt{7}}{2}$$

$$3x = (2x+3)(x-1)$$

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