

ASMA Practice #1

Dec 9, 2004 Contest

1. Given, $P = \frac{\frac{1}{m} + \frac{1}{n}}{\frac{1}{m} - \frac{1}{n}}$

Where m and n are different positive integers less than 20. Find the maximum value for P.

Oct 12, 2006 Contest

2. The points (0, 4), (0, 0), and (6, 0) are on a circle in the X-Y plane. What is the radius of the circle?

Mar 10, 2005 Contest

3. Evaluate the following and express your answer in simplest terms.

$$\frac{24876}{24876^2 - (24879)(24873)}$$

Nov 10, 2005 Contest

4. Find all solution(s) of $\sqrt{x} + \sqrt{x-5} - 3 = 0$

Jan 12, 2012 Contest

5. Thirty people are present in a room. Each person shakes hands just once with every other person. How many handshakes take place?

Feb 8, 2007 Contest

6. Find all real x that are solutions of $\frac{x-1}{\sqrt{2x+x^2}} = \frac{\sqrt{x-2}}{\sqrt{x}}$

Jan 11, 2007 Contest

7. The lengths of the sides of a triangle are 6, 8, and 10. Find the area of the larger of the two triangles formed by the angle bisector of the larger acute angle.

① $P = \frac{\frac{1}{m} + \frac{1}{n}}{\frac{1}{m} - \frac{1}{n}}$

$0 \leq m < 20$

$0 \leq n < 20$

Find max value for P.

$$P = \frac{\frac{n}{mn} + \frac{m}{mn}}{\frac{n}{mn} - \frac{m}{mn}}$$

$$P = \frac{\frac{n+m}{mn}}{\frac{n-m}{mn}} = \frac{n+m}{n-m} = P$$

$$= \frac{n+m}{n-m} = P$$

$$= \frac{n+m}{n-m} = P$$

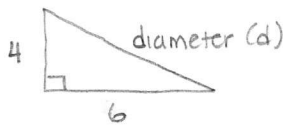
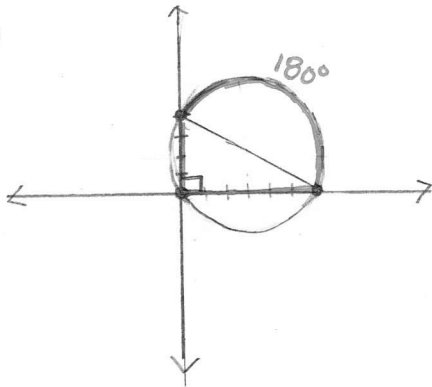
want num. to be as large as possible

$n=19$
 $m=18$

$P = \frac{19+18}{19-18} = \boxed{37}$

want the denom to be as small as possible but not neg.

②



$$4^2 + 6^2 = d^2$$

$$52 = d^2$$

$$d = \sqrt{52}$$

$$r = \frac{\sqrt{52}}{2}$$

$$r = \frac{\sqrt{4 \cdot 13}}{2}$$

$$r = \frac{2\sqrt{13}}{2}$$

$$r = \sqrt{13}$$

③ Evaluate

$$\frac{(24876)}{[24876^2 - (24879)(24873)]}$$

Either put into calculator, be careful w/ parentheses.

OR

let $x = 24876$

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

$$\frac{x}{x^2 - (x^2 - 9)}$$

$$\frac{x}{x^2 - x^2 + 9}$$

$$\frac{x}{9} = \frac{24876}{9} = \boxed{2764}$$

$$\textcircled{4} \sqrt{x} + \sqrt{x-5} - 3 = 0$$

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

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

$$x-5 = (3 - \sqrt{x})(3 - \sqrt{x}) \text{ FOIL}$$

$$x-5 = 9 - (3\sqrt{x})(2) + (\sqrt{x})^2$$

$$\cancel{x}-5 = 9 - 6\sqrt{x} + \cancel{x}$$

$$-5 = 9 - 6\sqrt{x}$$

$$-14 = -6\sqrt{x}$$

$$\frac{14}{6} = \sqrt{x}$$

$$\left(\frac{7}{3}\right)^2 = (\sqrt{x})^2$$

$$x = \frac{49}{9}$$

$\textcircled{5}$ 30 choose 2 combinations. Calc: **MATH** \rightarrow **PROB** \rightarrow **3: nCr**

$$30 C_2 = 435$$

$$30 \text{ nCr } 2$$

$$\textcircled{6} \frac{x-1}{\sqrt{2x+x^2}} = \frac{\sqrt{x-2}}{\sqrt{x}}$$

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

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

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

cross multiply

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

$$x-1 = \sqrt{(x-2)(x+2)} \text{ FOIL}$$

$$x-1 = \sqrt{x^2-4}$$

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

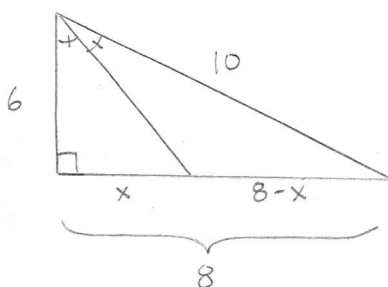
$$x^2 - 2x + 1 = x^2 - 4$$

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

$$-2x = -5$$

$$x = \frac{5}{2}$$

$\textcircled{7}$



$$\frac{x}{6} = \frac{8-x}{10}$$

$$10x = 6(8-x)$$

$$10x = 48 - 6x$$

$$16x = 48$$

$$x = 3$$

$$\begin{aligned} \text{Area}_{\Delta} &= \text{Area of whole } \Delta - \text{Area of small } \Delta \\ &= \frac{1}{2}(8)(6) - \frac{1}{2}(3)(6) \\ &= 24 - 9 \end{aligned}$$

$$\text{Area}_{\Delta} = 15 \text{ units}^2$$