Question 13

Determine $\cos(\theta)$ if $\cos(90^\circ - \theta) = a$ and $0 < \theta < 90^\circ$

Question 2

Find p such that $x^3 - px + 30$ has real roots and one of the roots is exactly 1 more than another root.

Question 3

Determine a, b, and c so that the graph of $y = ax^2 + bx + c$ contains the points (1,8), (-1,2) and (3,6)

Question 4

Express as a single fraction in lowest terms:

$$\frac{1}{1\bullet 2} + \frac{1}{2\bullet 3} + \frac{1}{3\bullet 4} + \ldots + \frac{1}{19\bullet 20}$$

Question 5

Set A consists of all natural numbers less than 60. A number is selected at random from the set. If it is known that it is a prime, what is the probability that the number contains a 9?
$R+S$

Question 6

Simplify to a single trigonometric expression

$$\frac{\sin\theta\tan\theta+\cos\theta}{\cos\theta}\bullet\frac{\sec\theta}{\cot\theta+\tan\theta}\bullet\frac{\tan\theta\csc^2\theta}{1+\tan^2\theta}$$

Question 7

Assign the numbers 1, 2, 3, 4 to the four team members in a clockwise order and follow directions precisely.

1. Rotate your numbers clockwise.
2. Switch the even numbers.
3. Switch the prime numbers.
4. Switch the perfect squares.
5. Repeat steps 2-4.
6. Rotate your numbers counterclockwise.
7. Switch the triangular numbers.
8. Switch the numbers which have a units digit of 1 when converted to binary.
9. Switch the numbers of those who had an even number initially.

Find the final number of the person who had the number 2 after step 2.

Question 8

Simplify and express in the form $a+bi$

$$\frac{12(\cos 200^\circ+i\sin 200^\circ)}{3(\cos 350^\circ+i\sin 350^\circ)}\bullet\frac{4(\cos 190^\circ+i\sin 190^\circ)}{2(\cos 70^\circ+i\sin 70^\circ)}$$

Question 9

Let A be the distance between the x and y intercepts of the graph of $2x-3y+12=0$.

Let B be the radius of the circle whose equation is

$x^2+y^2+2x+6y=5$

Let C be the value of $\cos(2x)$ if $\tan(x)<0$ and $\cos(x)=\frac{3}{\sqrt{13}}$

Find $A\bullet B\bullet C$ to the tenths place.

Question 10

A diagonal of a rhombus has a length of 5 cm. and each angle of the rhombus opposite that diagonal is three times as large as each of the other two angles of the rhombus. Find the length of each side of the rhombus to the nearest tenth.

Question 11

The initial dimensions of a rectangle are 4 cm. by 5 cm. The length and width of the rectangle increase at the rate of 1 cm/sec. How long will it take for the area to be 12 times its initial size?

Question 14

The London Bridge designed by John Rennie and completed in 1831 had five semi-elliptical arches. The central arch had a span of 152 ft. 6 inches and a rise at its center of 37 ft. 6 inches. Find the height of this arch 20 ft. from either end to the nearest tenth.

Question 1

If a statement is true its value is given in parentheses. If a statement is false its value is zero. Find **the sum** of the following statements.

(-9) If $f(x)=e^{5x}$, then $f^{-1}(x)=5\ln(x)$

(2) When $x^{63}-17$ is divided by $x-1$ its remainder is -16

(20) If $\log_b x=a$ and $\log_b y=c$, then $\log_b(y^3\sqrt{x})=\frac{a+6c}{2}$

(15) $\sin(x+\pi)=-\cos(x)$

(-3) $\sum_{k=1}^{\infty}\left(\frac{2}{3^{k-1}}\right)=3$

(32) $y=2\sin\left(\frac{x}{3}\right)$ has a period of $\frac{2\pi}{3}$

(-20) If a, b and c are consecutive integers, then abc is even

Question 12

$$2e^{5\ln(w)}=2(4^5)$$

$$2^{2x+5}=16$$

$$\log(4y-1)=1$$

Let z be the largest value such that ${}_7C_z=35$