HIGH SCHOOL PRECALCULUS QUIZ CONTEST 2015
SAMPLE QUESTIONS

(1) The quadrant in which the point with polar coordinates $\left(-1, -\frac{5\pi}{4}\right)$ lies is _____ (**Answer: Fourth**)
(2) What is the range of the quadratic function $f(x) = -(x+3)^2 - 2$? (**Answer:** $(-\infty, -2]$)
(3) What is the radius of the circle given by the equation $x^2 + y^2 - 6x = 0$? (**Answer:** 3)
(4) If $2^x = 1$ then what is the value of 2^{2x+1}? (**Answer:** 2)
(5) If f is an odd function such that $f(-2) = 1$ and g is an even function such that $g(1) = 2$ then $g(f(2)) = \underline{?}$ (**Answer:** 2)
(6) What is the value of $\sin(\arccos(-\frac{3}{5}))$? (**Answer:** $\frac{4}{5}$)
(7) The function $f(x) = x\cos x$ is an odd function (True or False). (**Answer: True**)
(8) (a) A polynomial with real coefficients has zeros i and $1 - i$, and 1. What is the smallest value of the degree of the polynomial? (**Answer:** 5)
    (b) A polynomial has zeros i and $1 - i$, and 1. What is the smallest value of the degree of the polynomial? (**Answer:** 3)
(9) If $\frac{\log a}{\log b} = 3$ then what is the value of $\log_b a^2$? (**Answer:** 6)
(10) If $x - 1$ is a factor of the polynomial $x^3 + k^2x^2 - kx - 3$ find the values of k? (**Answer:** -1 and 2)
(11) If $2^{10} + 4^5 = 2^x$ then what is the value of x? (**Answer:** 11)
(12) What is the period of the function $f(x) = \tan 5x$. (**Answer:** $\frac{\pi}{5}$)
(13) $\tan 38^\circ \tan 52^\circ =$ (**Answer:** 1)
(14) If $P(x) = (x^2 + x - 2)(x^2 - 4)(x + 2)$ what is the multiplicity of the zero -2? (**Answer:** 3)
(15) What is the maximum number of positive zeros of the polynomial $x^7 - 13x^6 - 6x^5 - 7x^4 + 11x^3 + 3x^2 - 6x - 5$. (**Answer:** 3)
(16) What is the value of $\sin^2 \frac{3\pi}{8} + \sin^2 \frac{\pi}{8}$? (**Answer:** 1)

(17) (a) If $\sin t$ and $\cos t$ are both positive or both negative then the possible values of t satisfy
   (i) $0 < t < \frac{\pi}{2}$.
   (ii) $0 < t < \pi$.
   (iii) $\frac{\pi}{2} < t < \pi$.
   (iv) $\pi < t < \frac{3\pi}{2}$.
   (v) $\frac{\pi}{2} < t < \frac{3\pi}{2}$.
   (vi) $\frac{3\pi}{2} < t < 2\pi$.
   (**Answer:** (i) and (iv))

   (b) If $0 \leq t \leq 2\pi$ and $\tan t$ is negative then what is the sign of $\sin 2t$? (**Answer: Negative**)

(18) If $x \neq 1$ and $x^3 = 1$ then what is the value of $x + x^2$? (**Answer:** -1)

(19) A quadratic equation has integer coefficients and leading coefficient in the equation is 1. If one of the roots of the quadratic equation is $2 + \sqrt{3}$ then the constant term in the equation is (**Answer:** 1)

(20) If $P(t)$ denotes the point on the unit circle with coordinates $\left(-\frac{3}{5}, \frac{4}{5}\right)$ then what are the coordinates of the point on the unit circle that corresponds to $P(\pi + t)$? (**Answer:** $\left(\frac{3}{5}, -\frac{4}{5}\right)$)