Pre-Calculus ***Name*** _____

Semester 1 Final Exam Review

Constructed Response

1. Given $x^4+x^3+7x^2+9x-18$,
   a. List all possible rational zeros
   b. Using the graph, synthetic division, and factoring/quadratic formula, find all zeros of the function (you must sow work for each zero).
2. Graph the function $f(x)=3\sin\frac{1}{2}(x-\pi)$
   a. Period _____ b. amp_____c. phase shift _____ d. vert shift _____
   e. domain _____ f. range _____
3. Prove the following identity $\frac{\sin t}{\tan t}+\frac{\cos t}{\cot t}=\sin t+\cos t$
4. Solve the following equation for all real numbers $\cos\frac{2\alpha}{3}=-1$

MULITPLE CHOICE SECTION

Non-Calculator:

1. Find the domain of the function $f(x)=\frac{1}{3\sqrt{x+7}}$
2. Determine the domain of f+g, f-g, fg, and f/g of $f(x)=\sqrt{x+4}\quad g(x)=\sqrt{x-1}$
3. Find $(f\circ g)(x)$ when $f(x)=x^2+1,\ g(x)=\sqrt{2-x}$
4. Write an equation for the inverse function, $f^{-1}(x)$ when $f(x)=\frac{2x+1}{x-3}$
5. What transformation(s) of $f(x)=\frac{1}{3}(x+2)^3-8$, occur based on its parent function?
6. Graph $f(x)=\frac{1}{2}x^2$, $f(x)=\sqrt[3]{x-1}$
7. Divide and express the result in standard form $\frac{3-4i}{3+4i}$
8. State whether the function crosses or turns around at each x-intercept $f(x)=x^3+6x^2+9x$

9. Divide and find the remainder $f(x)=\dfrac{3x^4+2x^2-8x+3}{x+3}$

10. Use Descarte's Rule of Signs to determine the amount of possible positive and negative zeros for $f(x)=2x^3+x^2-3x-1$

11. Find the vertical asymptote(s) of $f(x)=\dfrac{x-4}{x^2-x-6}$

12. Solve the rational inequality $f(x)=\dfrac{x^2+x-6}{x+1}>0$

13. State the correct value for $\tan\left(-\dfrac{\pi}{2}\right)$, $\sin\pi$, $\cos\dfrac{13\pi}{6}$, $\sec\dfrac{\pi}{4}$, $\csc\dfrac{5\pi}{6}$, $\cot(-765°)$, etc.

14. Use the Pythagorean Identity to find $\sin\theta$, given $\cos\theta=-\dfrac{4}{5}$ and $\pi<\theta<\dfrac{3\pi}{2}$

15. Find the exact value of the expression $\cos\dfrac{3\pi}{4}\cos\left(-\dfrac{\pi}{6}\right)+\cos\dfrac{5\pi}{3}\sin\dfrac{\pi}{2}$

16. Be able to identify the graphs of each of the six trigonometric functions.

17. Determine the period of $y=\dfrac{2}{3}\cos\left(\dfrac{2}{5}x-\dfrac{\pi}{4}\right)$

18. Determine whether the following is True or False: $\dfrac{\sin x}{\cos x+1}+\dfrac{\cos x-1}{\sin x}=0$

19. Determine whether the following is True or False: $\dfrac{\cos(\alpha-\beta)}{\cos\alpha\sin\beta}=\tan\alpha+\cot\beta$

20. Use the identities for cos(x ± y) to evaluate $\cos105°$

21. Find the exact value using identities for $\tan(x\pm y)$: $\dfrac{\tan25°+\tan35°}{1-\tan25°\tan35°}$

22. Find the exact value of $\cos(\alpha+\beta)$, if $\cos\alpha=\dfrac{5}{17}$, α lies in quadrant I, and $\sin\beta=-\dfrac{3}{4}$, β lies in quadrant IV

23. Find the exact value of $\sin2\theta$, if $\sin\theta=\dfrac{15}{17}$, θ lies in quadrant II

24. Solve for $0\le x\le2\pi$, $\sin x=-\dfrac{\sqrt{2}}{2}$

25. Solve: $2\cos^2x+3\cos x+1=0$ for $0\le x<2\pi$

PreCalculus Final Exam Review

Calculator Portion

1. You have 600 feet of fencing to enclose a rectangular plot that borders a river. If you do not fence the side along, the river, find the length and width of the plot that will maximize the area. What is the largest area that can be enclosed?

2. Convert $\frac{5\pi}{12}$ to degrees.

3. Use a calculator to evaluate $\csc\frac{\pi}{12}$.

4. Find the arc length of the intercepted arc in a circle of radius 13 in. and central angle of 110°.

5. A building that is 21 meters tall casts a shadow 25 meters long. Find the angle of elevation of the sun to the nearest degree.

6. Solve the equation $2\tan 2x = -6.2154$ for all real numbers.

7. Given that $a = 5, b = 7,$ and $C = 42^\circ$, solve the triangle.

8. Given that $A = 44^\circ, B = 25^\circ,$ and $a = 12$, solve the triangle.