Summer Work
Advanced PreCalculus

1. Write an equation of a line in point-slope form that is parallel to $2x-3y=6$ and passes through the point $(2,-1)$.

2. Determine the domain, range, y-intercept and zeros of each of the following:
(a) $f(x)=x^2-5$ (b) $g(x)=\sqrt{x+3}-1$ (c) $h(x)=\ln(x+e)$ (d) $k(x)=-|x|+2$

3. If $f(x)=x-5$ and $g(x)=x^2-1$, find all values of *x* so that $g(f(x))=0$.

4. Determine the inverse function of $f(x)=\sqrt[3]{x-1}+4$.

5. Simplify the following:
(a) $\left(\sqrt{-12}\right)\left(\sqrt{-3}\right)$ (b) $\sqrt{-18}-\sqrt{-3}$ (c) $\dfrac{4}{3+i}$ (d) $\left(2i\sqrt{5}\right)^2$

6. Factor using synthetic division and solve the equation $x^3-2x^2-5x+6=0$.

7. Determine the vertex coordinates, the axis of symmetry and the range of the quadratic function:
$f(x)=(x-2)^2+6$

8. Write an equation of a polynomial function in factored form whose graph will cross the *x*-axis at $x=-3$ and will be tangent to the *x*-axis at $x=2$.

9. Solve the following equations:

(a) $9^{x+1} = 27^{x-2}$ (b) $e^x = 3$ (c) $\ln(x+7) = 2\ln(x+1)$ (d) $\log_2(x-5) = 3$

10. Simplify and/or evaluate:

(a) $\dfrac{\frac{1}{x} - \frac{1}{2}}{x-2}$ (b) $e^{2\ln 3}$ (c) $9^{\left(-\frac{1}{2}\right)}$ (d) $\dfrac{8x^{-2}y^3}{4x^2y^2}$ (e) $\log_3\left(\dfrac{1}{81}\right)$

11. If the terminal ray of an angle passes through the point $(-5, -12)$, determine the values of all six of the trig functions of the angle.

12. Evaluate the following:

(a) $\sin 30^o$ (b) $\cos\dfrac{\pi}{4}$ (c) $\tan\pi$ (d) $\sin\dfrac{3\pi}{2}$ (e) $\cos\dfrac{7\pi}{6}$

(f) $\csc 120^o$ (g) $\cot 225^o$ (h) $\cos\dfrac{\pi}{2}$ (i) $\sec\dfrac{5\pi}{3}$ (j) $\cos\pi$

13. State the domain, range, amplitude and period of the graph of $y = 2\sin\left(\dfrac{\pi}{3}x\right) + 1$.

14. Solve the following equations over the domain $[0, 2\pi)$:

(a) $2\sin x - 1 = 0$ (b) $\tan^2 x = 1$ (c) $2\cos^2 x - \cos x = 1$