Pre-Calculus 12 Midterm Review

TRANSFORMATIONS

1. Describe the transformations, in an appropriate order, that would take you from the graph of $y=f(x)$ to the graph of $y=-0.5\text{f}(0.5x-3)-10$.
2. Determine the inverse of the function $f(x)=\dfrac{3x+1}{x}$. Is the inverse also a function?
3. (2, –3) is a point of the graph of $y=f(x)$. Determine a point on the graph of $y=-f(6-2x)+2$.
4. Suppose the relation $y=r(x)$ represents the unit circle; that is, the circle of radius 1 centred on the origin. Sketch $y-4=5r(x+3)$.
5. Determine the equation of the function $y=\sqrt{x}-3$ that is reflected through the line:
   a) $x=0$ b) $y=0$ c) $y=2$

RADICAL & POLYNOMIAL FUNCTIONS

1. Suppose $f(x)=-0.5(x+2)^2+2$. Graph $y=f(x)$ and $y=\sqrt{f(x)}$ on the same set of axes.
2. Consider the point (x, y) on the graph of the function $y=f(x)$. Use mapping notation to show its image point under the transformation described by $y=-\sqrt{f(2x)}$.
3. Solve the radical equation: $x+3=\sqrt{18-2x^2}$ graphically and algebraically.
4. Factor $h(x)=-x^3+5x^2-7x+3$ as much as possible. Then describe how you can use this factored form to sketch $y=h(x)$ without the use of technology. Finally, sketch the function.
5. Provide a possible equation for an even-degree polynomial function with zero constant term and three unique roots of different multiplicities. The point (1, –2) must satisfy your equation.

RATIONAL & COMPOSITE FUNCTIONS

1. Consider the functions $f(x)=1-x$ and $g(x)=x^2-1$.
   a) Determine $(g\circ f)(-1)$.
   b) Write a simplified equation for $y=\left(\dfrac{f}{g}\right)(x)$. State any asymptotes, intercepts, and points of discontinuity.
   c) Graph $y=(f-g)(x)$. Describe two ways you could do this.
2. Sketch a graph of the rational function $y=\dfrac{2x^2-2}{x^2+3x-4}$ without the use of technology.
3. Solve the following equation algebraically and graphically: $\dfrac{2x-1}{x^2-x}+4=\dfrac{x}{x-1}$. Then compare the solutions found using each method.
4. Consider the functions $f(x)=x-1$ and $g(x)=\dfrac{1}{2x}$. Write a simplified equation for $y=f(g(g(x)))$. Then state the domain and range of this composite function.
5. Solution A has a concentration of 0.15 g/ml and solution B has a concentration of 0.030 g/ml of the same substance. You start with 150 ml of solution A and pour in x ml of solution B.
   a) Write an equation for the concentration, $C(x)$, of the solution after x ml have been added.
   b) Determine how many millilitres need to be added to get a concentration of 0.10 g/ml.