

Each problem is worth 12 points and the bonus problem is worth 10 points for a total of 118 points out of 100 possible.

1. If $f(x) = \frac{x+3}{x+1}$, evaluate and simplify $\frac{f(x) - f(1)}{x-1}$

2. Find an expression for a quadratic function $f(x)$ if $f(-1) = f(1) = 0$ and $f(2) = 6$.

3. Let $f(x) = 1 - 3x$ and $g(x) = 5x^2 + 3x + 2$. Find $(g \circ f)(x)$.

4. Find the exponential function $f(x) = Ca^x$ whose graph contains the points $(1, 6)$ and $(4, 24)$.

5. Find a formula for the inverse function of $f(x) = \frac{2}{1-3x}$.

6. Find the exact value of each expression:

a). $\log_{16} 2 + \log 0.01$

b). $2^{\log_{\sqrt{2}} 3}$

7. Solve the equation $2^x + 2^{x+1} = 12$.

8. Solve the equation $\ln x = 1 + \ln(x - 1)$.

9. Eliminate the parameter to find a Cartesian equation of the curve $x = t^2$, $y = t^3$.

10.[BONUS 10pts] If $(f \circ g)$ is one-to-one, then show that g is also one-to-one.