NAME:

1. Differentiate $y = \left(e^{\sqrt{x}}\right)^2$.

2. Differentiate $y = x^{(x^2+1)}$.

3. Let $f(x) = 2x + \cosh x$ with domain $[0, \infty)$. Find $(f^{-1})'(1)$.

4. Let $g(x) = \dfrac{3x}{x+1}$. Find a formula for $g^{-1}(x)$.

5. Let $y = \sin(\ln x)$. Find y''.

6. Evaluate the integral $\displaystyle\int \frac{t^2}{4-t^3}\,dt$.

7. Evaluate the integral $\int_0^{\frac{\pi}{2}} (\cos x) e^{\sin x} dx$.

8. A 100°C peach pie is placed in a 0°C cooler. Assume that the pie obeys Newton's law of cooling and the rate of change of its temperature is proportional to its difference from the temperature of the environment. After 10 minutes the pie has cooled to 50°C. When will the pie reach 25°C?

9. Evaluate the following:

a) $\tan\left(\cos^{-1}\frac{1}{3}\right)$

b) $\sin^{-1}\left(\sin\frac{3\pi}{4}\right)$

10. Differentiate $y = \cos^{-1}(e^x)$.

11. Find the limit $\lim_{t \to 0} \dfrac{10^t - 1}{t}$.

12. Find the limit $\lim_{x \to \infty} x \sin\left(\dfrac{1}{x}\right)$.

13. Find the limit $\lim_{x \to 0} (1 + x^2)^{\frac{1}{x}}$.

14. Differentiate $y = \dfrac{x^3 \sqrt{x^2 + 1}}{(x + 2)^5}$.