Calculus I
Sample Exam 2

Do all ten problems. For maximum credit, show your work and justify your answers; answers alone will seldom receive full credit. If you show your work and if your answer is wrong, you may still receive partial credit. You need not simplify answers. Each of the ten problems is worth 10 points.

1. Compute $\frac{d}{dx}\sin(x) + \cos(2x)$.

2. Compute $\frac{d}{dx}3^x$.

3. Compute $\frac{d}{dx}x\ln x$.

4. Compute $\frac{d}{dx}\arctan(e^x)$.

5. Compute $\frac{d}{dx}\tan(\cos x)$.

6. Compute $\frac{d}{dx}(\sin x)^{2x}$.

7. Compute the derivative y' if $\cos(x)\sin(y) = (xy)^2$

8. Find $\lim_{x\to 0}\frac{\cos(x)-1}{\tan x}$.

9. Determine local maximum and minimum points and inflection points for $f(x) = \frac{x^3}{1-x^2}$. The derivatives of f are
$$f'(x) = \frac{x^2(3-x^2)}{(1-x^2)^2} \qquad f''(x) = \frac{2x(3+x^2)}{(1-x^2)^3}$$

10. Sketch the graph of $f(x) = x^4 - 4x^3 + 16x$. The derivatives of f are
$$f'(x) = 4(x+1)(x-2)^2 \qquad f''(x) = 12x(x-2)$$