Calculus 121: Practice problems for Test 2

1) Evaluate the derivative of $(x^2+1)^3$

2) Find the derivative of $f(x) = \frac{x+\sin x}{x-x^3}$.

3) For what values of x does the graph of $f(x) = x^3+3x^2+x+3$ have a horizontal tangent?

4) Find the derivative of $g(x) = \frac{x^2}{x+h(x^3)}$ in terms of h. Check your formula in the special case $h(x) = x^3$.

5) Find the value of the limit

$$\lim_{t\to 0} \frac{\tan 11t}{\sin 4t}$$

by interpreting the limit as a derivative. No other method is acceptable.

6) Let $r(x) = f(g(h(x)))$, where $h(1) = 2$, $g(2) = 3$, $h'(1) = 4$, $g'(2) = 5$ and $f'(3) = 6$. Find $r'(1)$.

7) Evaluate the first two derivatives of

$$f(x) = e^{3\tan\sqrt{x}}$$

Do not simplify.

8) If $f(1) = 2$ and $f(x) + x^2(f(x))^3 = 10$, find $f'(1)$.

9) Find the equation of the tangent line to the curve $y^2 = x^3+3x^2$ at the point $(1,-2)$. Find points where the tangent is horizontal.

10) Find the derivative of the function

$$g(x) = x^x + x^{-x}.$$

11) Find the equation of the tangent line to the inverse of the graph $y = (x+11)/(3x-1)$ at $x = 1$. Do it by first finding an explicit form of the inverse and then by a different method.