Calculus Quiz of basic facts:

1. What is the definition of a derivative: $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$

2. What is the alternate form of the definition of a derivative $\lim_{x\to a} \frac{f(x)-f(a)}{x-a}$

Evaluate the following limits:

3. $\lim_{x\to 0} \frac{\sin x}{x} = 1$

4. $\lim_{x\to 0} \frac{1-\cos x}{x} = 0$

5. The average value of a function over an interval. $1/(b-a) \int_a^b f(x)\,dx$

Write the answers to the following common derivatives (different with respect to x)

6. c =0
7. mx + b m
8. x^n $n x^{n-1}$
9. e^x e^x
10. a^x $a^x \ln a$
11. lnx 1/x
12. $\log_a x$ $1/(x \ln a)$
13. sinx cosx
14. cosx -sinx
15. tanx $\sec^2 x$
16. secx secx ·tanx
17. cscx -cscx (cotx)
18. cotx $-\csc^2 x$
19. arcsinx $1/(\sqrt{1-x^2})$
20. arccosx $-1/(\sqrt{1-x^2})$
21. arctanx $1/(x^2+1)$
20. arcsecx $1/(|x|\sqrt{x^2-1})$
21. arccscx $-1/(|x|\sqrt{x^2-1})$
22. arccotx $-1/(x^2+1)$
23. uv (the product rule) $u\cdot v' + v\cdot u'$
24. u/v (the quotient rule) $\frac{v\cdot u' - uv'}{v^2}$
25. Explain implicit differentiation (you may use an example)

$y^2 + y = x$

$2y\cdot y' + y' = 1$

$(2y+1)\,y' = 1$

$y' = 1/(2y+1)$