Solutions to Practice Test

1) $f'(x) = 5$

2) $g'(x) = 9x^2 - 8x + 1$

3) $y' = 2(3x-5)\cdot 3$

$y' = 6(3x-5)$

$y' = 18x - 30$

4) $y' = \dfrac{6x(x^3-8) - 3x^2(3x^2-1)}{(x^3-8)^2}$

$y' = \dfrac{6x^4 - 48x - 9x^4 + 3x^2}{(x^3-8)^2}$

$y' = \dfrac{-3x^4 + 3x^2 - 48x}{(x^3-8)^2}$

5) $y' = \dfrac{\cos x(\sqrt{x}) - \frac{1}{2}x^{-1/2}\sin x}{x}$

6) $f'(x) = \dfrac{6\tan x - \sec^2 x \cdot 6x}{\tan^2 x}$

7) $y' = \sec x \tan x \cdot \tan x + \sec^2 x \sec x$

$y' = \sec x \tan^2 x + \sec^3 x$

8) $y' = 3\csc^2 x(-\csc x \cot x)$

9) $\dfrac{dy}{dx} = 60(5x+7)^{59}\cdot 5 = 300(5x+7)^{59}$

10) $f'(x) = 4(2-3x^2)^3(-6x)(x^7+3)^3 + 3(x^7+3)^2(7x^6)(2-3x^2)^4$

11) $g'(x) = 3(x - \cos x)^2(1 + \sin x)$

12) $y' = -\csc(g(x))\cot(g(x))\cdot g'(x)$

13) $y' = \frac{1}{3}(f(x) + g(x))^{-2/3}(f'(x) + g'(x))$

14) $y' = \sec^2(2x)\cdot 2$

15) $g'(x) = \dfrac{1(1+\sec(f(x))) - \sec(f(x))\tan(f(x))f'(x)\,x}{(1+\sec(f(x)))^2}$

16) $f'(x) = 2\cos(\cos(\cos($

15) $$g'(x) = \frac{1(1+\sec(f(x))) - \sec(f(x))\tan(f(x))f'(x) \cdot x}{(1+\sec(f(x)))^2}$$

16) $f'(x) = 2\cos(\cos(\cos(3x))) \cdot \sin(\cos(\cos(3x)))\sin(\cos(3x))\sin(3x) \cdot 3$

17) a) $y = \sin(2x)$

$y' = \cos(2x) \cdot 2 = 2\cos(2x)$

b) $y = 2\cos x \sin x$

$y' = 2(-\sin x)\sin x + \cos x \cdot 2\cos x = -2\sin^2 x + 2\cos^2 x$

c) $2\cos(2x) = -2\sin^2 x + 2\cos^2 x$

$2\cos(x+x) =$ ''

$2(\cos x\cos x - \sin x \sin x) =$ ''

$2\cos^2 x - 2\sin^2 x = -2\sin^2 x + 2\cos^2 x$

18) $y' = 2(x-2)$

$y = 2x+2$

$\downarrow$

$-1/2 =$ slope of perpendicular

$y' = 2x - 4 = -1/2$

$2x = -1/2 + 4$

$2x = \frac{7}{2}$

$x = 7/4$

$y = (\frac{7}{4} - 2)^2$

$y = (-1/4)^2 = 1/16$

$(7/4, 1/16)$

19. True

20. False π is a constant so if $y=\pi^5$, then

$\frac{dy}{dx}=0$

21. False, $3x^2$ is the formula for the slope of the tangent. You must plug in 1 for x to get the actual slope of the tangent line.

22. False ~~sinx~~

$f^{30}(x)=-\sin x$

$f' = \cos x$

$f'' = -\sin x$

$f^{(3)}(x) = -\cos x$

$f^{(4)}(x) = \sin x$

$\vdots$

every 4 derivatives you get back to sinx

so

$f^{(28)} = \sin x$

$f^{(29)} = \cos x$

~~23.~~

23. $y=\sec(\sec(x))$

$y' = \underbrace{\sec(\sec(x))}_{1st}\cdot\underbrace{\tan(\sec(x))}_{2nd}\cdot\underbrace{\sec(x)\tan(x)}_{3rd}$

$y'' = \sec(\sec(x))\tan(\sec(x))\sec(x)\tan(x)\cdot\tan(\sec(x))\sec(x)\tan(x) +$
$+ \sec^2(\sec(x))\cdot\sec(x)\tan(x)\cdot\sec(\sec(x))\cdot\sec(x)\tan(x) +$
$(\sec(x)\tan(x)\cdot\tan(x) + \sec^2 x\sec x)\cdot\sec(\sec(x))\tan(\sec(x))$

24 + 25 see notes