Derivatives of Basic Functions Worksheet - Answer Key

1. Find $f'(x)$ for $f(x) = 2x^3 - (-2x) + \pi$.

   $f'(x) = 6x^2 + 2$

2. Find $\frac{dg}{dy}$ for $g(y) = 2\sin(y) + tan(\pi) + 3y^2$.

   $\frac{dg}{dy} = 2\cos(y) + 6y$

3. Find $\frac{dw}{dz}$ for $w(z) = \pi^z - z^\pi$.

   $\frac{dw}{dz} = \ln(\pi)\pi^z - \pi z^{\pi-1}$

4. Find $h'(u)$ for $h(u) = \ln(u^2)$.

   $h(u) = 2\ln(u) \implies h'(u) = \frac{2}{u}$

5. Find $\lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$ for $f(x) = \frac{2}{x^2} - 4x^2$.

   $\frac{-4}{x^3} - 8x$

6. Find $\frac{d}{dz}(\sin(\pi)\sin(z) + \ln(5y))$.

   $\frac{1}{y}$

7. Find $l'(x)$ is $l(x) = \sqrt{x}\left(x^2 + \frac{1}{x}\right)$.

   $l'(x) = \frac{5}{2}x^{3/2} - \frac{1}{2}x^{-3/2}$

8. Find $\frac{d}{du}(4x^{100} - 6x^7 + 9x + \ln(2))$.

   $400x^{99} - 47x^6 + 9$

9. Find $[x^2 + e^x + |x|]'$.

   The function if not differentiable.

10. Find $u'(x)$ if $u(x) = \frac{x^3 - x\cos(x)}{x}$.

    $u(x) = x^2 - \cos(x) \implies u'(x) = 2x + \sin(x)$
