Pledge:

I. Find the indicated derivatives. Neatly show all work and <u>clearly indicate your answer</u>. (3 points each, 12 points total)

(a) $l(x) = e^4 + \pi^3 e^x$, $l'(x) = \boxed{\pi^3 e^x}$

   $\downarrow$
   constant

(b) $y = \dfrac{2x^3 - 4\sqrt[4]{x}}{x^4}$, $\dfrac{dy}{dx} = \boxed{-2x^{-2} + 4x^{-19/4}}$

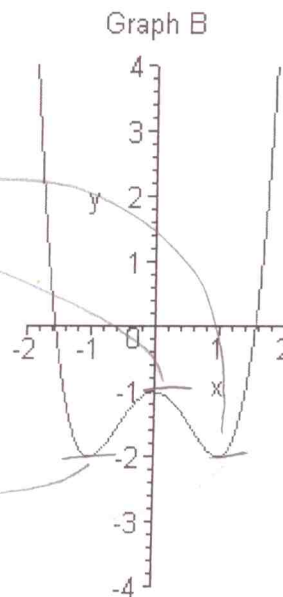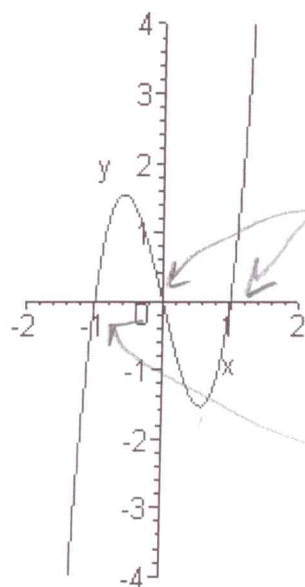 $\hookrightarrow y = 2x^{-1} - 4x^{1/4 - 4} = 2x^{-1} - 4x^{-15/4}$

(c) $z = (\pi^2 r^3)^2$, $\dfrac{dz}{dr} = \pi^4 6 r^5 = \boxed{6\pi^4 r^5}$

   $\hookrightarrow z = \pi^4 r^6$

(d) $p(t) = \dfrac{7}{t^8} + \dfrac{1}{\sqrt{t^3}} + 11 e^x$, $\dfrac{d}{dt} p(t) = \boxed{-56 t^{-9} - \frac{3}{2} t^{-5/2} + 11 e^x}$

   $\hookrightarrow p(t) = 7t^{-8} + t^{-3/2} + 11e^x$

II. Below you are given two graphs drawn on the same scales, Graph A and Graph B. One of these graphs is the graph of a function and the other is the graph of the derivative of the function. Which is which? (2 points)

Function = _Graph B_   Derivative of Function = _Graph A_

Graph A

Graph B

III. Find the equation of and accurately graph the tangent line to the function $f(x) = x\sqrt{x}$ that is parallel to the line $y = 1 + 3x$. Below you are given the graph of f and the graph of the line drawn on the same axes. Neatly show all work to optimize your chance of receiving partial credit. Clearly indicate your answers. (6 points total)

$f(x) = x\sqrt{x} = x^{3/2}$

$f'(x) = \frac{3}{2} x^{1/2}$

Want x so that slope = 3

So set

$\qquad f'(x) = 3$

and solve for x:

$\qquad \frac{3}{2} x^{1/2} = 3$

$\Rightarrow x^{1/2} = 2$

$\Rightarrow x = 4$

$f(4) = 4\sqrt{4} = 8$

point on t.l. is $(4, 8)$

$y - 8 = 3(x - 4)$

$y = 3x - 12 + 8$

$\boxed{y = 3x - 4}$