Name: Solutions Math 231 Quiz 3

1. (8 pts) Find the *first* and *second* derivatives of the function.

(a) $f(x) = x^2 - 2x + 2^{32}$ ← constant

$f'(x) = \boxed{2x - 2}$

$f''(x) = \boxed{2}$

(b) $g(t) = \sqrt{t} - \dfrac{1}{\sqrt{t}}$

$g(t) = t^{1/2} - t^{-1/2}$

$g'(t) = \frac{1}{2}t^{-1/2} - (-\frac{1}{2})t^{-3/2}$

$= \boxed{\frac{1}{2}t^{-1/2} + \frac{1}{2}t^{-3/2}}$

$g''(t) = \boxed{-\frac{1}{4}t^{-3/2} - \frac{3}{4}t^{-5/2}}$

2. (12 pts) Differentiate the function.

(a) $y = x^2(1 - x)$

$y = x^2 - x^3$

$y' = \boxed{2x - 3x^2}$

(b) $y = \dfrac{x^2+1}{x}$

$$y = \frac{x^2}{x} + \frac{1}{x}$$

$$= x + \frac{1}{x}$$

$$= x + x^{-1}$$

$$y' = 1 + (-1)x^{-2}$$

$$= 1 - x^{-2}$$

$$= \boxed{1 - \frac{1}{x^2}}$$

(c) $h(\theta) = 2(\sin\theta)(\cos\theta)$

$$h'(\theta) = 2\left((\sin\theta)(\cos\theta)\right)'$$

$$= 2\left((\sin\theta)'(\cos\theta) + (\sin\theta)(\cos\theta)'\right)$$

$$= 2\left((\cos\theta)(\cos\theta) + (\sin\theta)(-\sin\theta)\right)$$

$$= \boxed{2\left((\cos\theta)^2 - (\sin\theta)^2\right)}$$