

## Practice Quiz 2.1

### Key

$$1. a. H'(5) = 5g'(5) - (7) \frac{g(5)f'(5) - f(5)g'(5)}{[g(5)]^2} = -24.65$$

$$b. H'(6) = f'[f(6)] \times f'(6) = f'(5) \times (-8) = -56$$

$$c. g(6) = 8 \Rightarrow f(8) = 6 \Rightarrow f'(8) = \frac{1}{g'[f(8)]} = \frac{1}{g'(6)} = \frac{1}{15}$$

$$2. 3\cot^2(x^2) \cdot -\csc^2(x^2) \cdot 2x.$$

$$3. \text{Diff. both sides: } 2xy + x^2y' - 3y' + y^2 + x2yy' = 0$$

$$\text{Isolate } y' : y' = \frac{-2xy - y^2}{x^2 - 3 + 2xy}$$

$$y' @ (1, 4) : \frac{-2(1)(4) - (4)^2}{(1)^2 - 3 + 2(1)(4)} = -4$$

$$\text{Eqn. of tangent: } y_T = -4(x-1) + 4$$

$$4. \text{If the slope is 3 then } f'(x) = 3 \Rightarrow 3x^2 = 3 \Rightarrow x = \pm 1$$

$$@ x=1, y=3(1)^3 - 2 = 1 \quad @ x=-1, y=3(-1)^3 - 2 = -5$$

$$\text{Coordinates: } (1, 1) \text{ and } (-1, -5)$$

$$5. a. v(t) = s'(t) = 6t - 2 \quad \text{when object is at rest, } v(t) = 0 \Rightarrow t = \frac{1}{3}$$

$$b. a(t) = v'(t) = 6 \quad @ t=0.1 \quad a(0.1) = 6, \quad v(0.1) = -1.4 \quad \text{since } a(0.1) > 0 \text{ and } v(0.1) < 0 \Rightarrow \text{object is slowing down.}$$

$$c. \frac{v(5) - v(1)}{5 - 1} = \frac{28 - 4}{4} = 6$$

$$6. g(21) \text{ is the } y\text{-coord on } g(x) \text{ at } x=21. \text{ Since, } g(x) = f^{-1}(x) \text{ then } 21 \text{ must be the } y\text{-coord on } f(x).$$

Find the  $x$ -coord on  $f(x)$  that "goes" with  $y$ -coord of 21.

$$\Rightarrow \text{Solve: } 21 = 3x^3 - 2x^2 + 5 \text{ using your GC } \Rightarrow x=2$$

$$\Rightarrow (21, 2) \text{ is on } g(x) \text{ and } (2, 21) \text{ is on } f(x)$$

$$\Rightarrow g(21) = 2 \quad \text{and} \quad g'(21) = \frac{1}{f'(2)} \quad f'(x) = 9x^2 - 4x \Rightarrow f'(2) = 28 \Rightarrow g'(21) = \frac{1}{28}$$