MA1032 - Exam I Review

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I am prone to mistakes and I typed this up very quickly, so please email me if you think there is a mistake.

- 1. (a) 20
 - (b) 30
 - (c) 30
 - (d) 10 & 40
 - (e) No because s(20) = 10 and s(20) = 4, so we have two outputs for one input.
- 2. (a) $\frac{\Delta f}{\Delta x} = \frac{f(10) f(5)}{10 5} = 0.15$ (b) $\frac{\Delta f}{\Delta x} = \frac{f(25) - f(20)}{25 - 20} = 0.05$
 - (c) The rates of change are decreasing, so f(x) is increasing at a decreasing rate.

3.
$$(a)$$

$$\begin{array}{ll} \frac{\Delta g}{\Delta t} &= \frac{g(1) - g(0)}{1 - 0} = 0.35\\ &= \frac{g(3) - g(1)}{3 - 1} = 0.35\\ &= \frac{g(5) - g(3)}{1 - 0} = 0.35\\ &= \frac{g(10) - g(5)}{10 - 5} = 0.35 \end{array}$$

The average rate of change is constant so the function is linear.

- (b) g(t) = 0.6 + 0.35x
- 4. (a) y = 300 + 4x
 - (b) The slope is 4, which indicates that for every thousand dollars spent on advertising, the car company sells 4 more cars.

5. (a)
$$y = \frac{33}{8} + \frac{3}{8}x$$

(b) $(\frac{93}{73}, \frac{336}{73})$

6. $x \leq 1$ and $x \neq -2$

- 7. Domain: $2 \le x \le 10$ Range: $1 \le y \le 3$
- 8. (a)



(b)
$$f(3) = -8$$

(c) $f(2) = -3$

9. (a)
$$f(-3) = 2$$

(b) $f^{-1}(2) = -3$
(c) $f(2) = -2$
(d) $f^{-1}(-3) = 5$
10. $r = f^{-1}(A) = \sqrt{\frac{A}{4\pi}}$ where $r \ge 0$.
11.

$$\frac{\Delta g}{\Delta t} = \frac{g(1) - g(0)}{1 - 0} = 1$$

$$- \frac{g(2) - g(1)}{1 - 0} = 2$$

$$= \frac{g(2) - g(2)}{2 - 1} = 2$$
$$= \frac{g(3) - g(2)}{3 - 2} = 6$$

The average rate of change is increasing so the graph is concave up.

12. (a) He makes \$100 more than his current level of sales.

- (b) The profit he makes when he sells 5 more television sets per week than his current level.
- (c) The profit he makes when he sells twice as many television sets per week than is current level.
- 13. (a) $g(x+h) = x^2 + 2xh + h^2 2x 2h$ (b) $\frac{g(x+h)-g(x)}{h} = 2x + h - 2$
- 14. (a)

(b)



15. (a)
$$t = \frac{117}{12}$$

(b) $y = \frac{3c+d}{b-3a}$
(c) $x = \frac{-3\pm\sqrt{249}}{8}$
(d) $x = \frac{-4}{3}$ or $x = 2$
(e) $y = -2 \pm \sqrt{6}$
(f) $x = \frac{7}{16}$
16. $4x^2 - 6x + 6$

17. (a)
$$(x+3)(x+2)$$

(b) $(3x-4)(x+1)$