Solution for Test 1.

1. (A). Put $x=0$

$$y\text{-intercept} = -2(0)+5/3 = 5/3.$$

2. (B). (I) has slope $\frac{1}{2}$

(II) has slope -1 $(y=-x)$

III has slope $\frac{1}{2}$ $(y=\frac{1}{2}x+\frac{1}{2})$

3. (D)

$$f(2x) = 2x\,(2x-2)$$
$$= 4x\,(x-1).$$

4. (D)

$$g(h(x)) = \frac{\frac{1}{x}}{\frac{1}{x}+3} = \frac{\frac{1}{x}\cdot x}{(\frac{1}{x}+3)\cdot x} = \frac{1}{1+3x}.$$

5. (E) Use Vertical line Test.

6. (C)

$$\text{slope} = \frac{2-1}{1-(-2)} = \frac{1}{3}$$

$$y-2 = \frac{1}{3}(x-1)$$

$$y = \frac{1}{3}x-\frac{1}{3}+2 \Rightarrow y = \frac{1}{3}x+5/3$$

7 (A) $2x-1 \geq 0 \Rightarrow x \geq \frac{1}{2}.$

8. (A) $\dfrac{a^{3/2} b^{0}}{(ab)^{\frac{1}{2}} c^{0}} = \dfrac{a^{3/2} \cdot 1}{a^{1/2} b^{1/2} \cdot 1} = \dfrac{a^{3/2 - \frac{1}{2}}}{b^{1/2}} = \dfrac{a}{b^{1/2}}.$

9. (E) $\lim_{x \to 1} \dfrac{x^2 - 1}{x - 1} = \lim_{x \to 1} \dfrac{(x+1)(x-1)}{x-1} = \lim_{x \to 1} (x+1) = 2.$

10. (C) $\lim_{x \to 4} \dfrac{x-4}{\sqrt{x} - 2} = \lim_{x \to 4} \dfrac{x-4}{\sqrt{x}-2} \cdot \dfrac{\sqrt{x}+2}{\sqrt{x}+2}$

$= \lim_{x \to 4} \dfrac{(x-4)(\sqrt{x}+2)}{(x-4)}$ $\quad (a^2 - b^2 = (a+b)(a-b))$

$= \lim_{x \to 4} (\sqrt{x} + 2)$

$= \sqrt{4} + 2 = 4.$

11. (E) $\lim_{x \to +\infty} \dfrac{3x^3 + 2x^2 + 1}{2x^2 + 5x + 3} = \lim_{x \to +\infty} \dfrac{3 + \frac{2}{x} + \frac{1}{x^3}}{\frac{2}{x} + \frac{5}{x^2} + \frac{3}{x^3}}$

$= \dfrac{3 + 0 + 0}{0 + 0 + 0} = \dfrac{3}{0} = +\infty$

12. (B) $\lim_{x \to +\infty} \dfrac{2x^2}{2x^2 + 1} = \lim_{x \to +\infty} \dfrac{2}{2 + \frac{1}{x^2}} = \dfrac{2}{2 + 0} = 1$

13. (D) $\lim_{x \to 1^+} f(x) = \lim_{x \to 1^+} (11x)$

$= 11(1) = 11.$

14. $\lim_{x\to -1} \frac{1-x^4}{1+x} = \lim_{x\to -1} \frac{(1-x^2)\cdot(1+x^2)}{1+x}$

$= \lim_{x\to -1} \frac{(1+x)(1-x)\ (1+x^2)}{1+x}$

$= \lim_{x\to -1} (1-x)(1+x^2)$

$= (1-(-1))\cdot(1+(-1)^2)$

$= 2\cdot 2$

$= 4.$

15. $f(x) = -x^2 - 10x + 11$

y-intercept $= f(0) = 11$

x-intercept : $-x^2 - 10x + 11 = 0$

$-(x+11)(x-1) = 0$

$x = -11$ or $x = 1.$

$f(x) = -(x^2 + 10x - 11)$

$= -\left(x^2 + 10x + \left(\frac{10}{2}\right)^2 - \left(\frac{10}{2}\right)^2 - 11\right)$

$= -\left((x+5)^2 - 36\right)$

$= -(x+5)^2 + 36$

Vertex : $(-5, 36)$.