RISPOSTE AGLI ESERCIZI DEL CAPITOLO 1 DELLE DISPENSE (per quelli con la doppia freccia si veda in fondo alle stesse).

1.2 i) 66 per cento; ii) 32 per cento; iii) circa il 48 per cento.

1.3 i) A Roma il 5 per cento, a Milano il 30 per cento; ii) a Roma il 2 per cento, a MIlano il 3 per cento.

1.4 $a^{1/15}b^{1/2}c^{11/6}$, $a^{-5/12}b^{-17/12}c^{-13/6}$, $a^{1/15}b^{4/15}c^{-1/15}$.

1.5 $a^6b^3c^{3/2}$, $2a^{10/3}$, $\frac{3}{4}a^{-1/6}b^{-3/2}$, c.

1.6. $4^{30} < 8^{25} < 2^{200} < 16^{51}$.

1.7. $4\log 2 + 7 - 11\log 3 - 3\log 7$, $\frac{1}{n}(12\log a + p\log b - \log c)$, $\log 3,55 - 100$

1.8 $-\frac{3}{2}\log a + \frac{3}{2}\log b + 5\log c$, $2 - 4\log 5$, $\frac{1}{2}(\log a + \log b + \log c) - 2\log 5 + 2$

1.9 $45, 38, 87$.

1.10 $47, 95, 39$.

1.11 $90, 38$.

1.12 47.

1.13 410 chilometri.

1.14 $\frac{x^3+x-1}{x^3+1}$, 0, $\frac{3x^2-2x^2+1}{(x^2-x+2)(x^2-1)}$, $\frac{-6x^2-9x-30}{2x^2-x-15}$, $\frac{-8x^2+42x-33}{(2x+3)(2x-3)^2}$, $\frac{-2x^2-x+1}{1-x^2}$, $\frac{1}{(1+x)^2}$, 0.

1.16 $a = -1, b = c = \frac{1}{2}$.

1.17 $x = \frac{5\pm\sqrt{17}}{2}$, $x = \pm\sqrt{2}$, $x = \frac{1}{3}, 3$.

1.18 $x = \pm\frac{\sqrt{2}}{2}$, $x = 1$, impossibile.

1.19 $x - 1$, $\frac{1}{x-1}$, $\frac{2x+1}{x-1}$, $\frac{x^2-1}{2x}$.

1.20 $x = 1$, $x = 2$, $x = 2$.

1.21 $[-1, \frac{1}{2}]$, $(\frac{1-\sqrt{73}}{6}, \frac{1+\sqrt{73}}{6})$, tutti i reali, nessuna soluzione.

1.23 $(\frac{5}{2}, 4)$, $(-\frac{6}{7}, 3)$, $(-4, -3] \cup [1, +\infty)$.

1.25 $x = 2$, $x = 0, -2$, $x = 1, -1 - \sqrt{2}$,
$x = \frac{-1-\sqrt{17}}{4}$, $x \geq 0$, $x = \frac{-3-\sqrt{17}}{2}, 1, 2$,
$x = 1$, $x = \frac{1-\sqrt{7}}{2}$, $x = \frac{\pm 7\pm\sqrt{13}}{6}$,
$x = \frac{3+\sqrt{13}}{2}$, nessuna soluzione, $x = -2, -\frac{3}{2}$,
$x = -1 - \sqrt{2}, 1$, nessuna soluzione, $x = -\frac{4}{5}, \frac{4}{7}$.

1.26 $[-\frac{1}{2}, +\infty)$, $(-\infty, -1) \cup (5, +\infty)$, $[2, +\infty)$,
$[\frac{1-\sqrt{5}}{2}, \frac{1+\sqrt{5}}{2}]$, $[\frac{-1-\sqrt{17}}{2}, +\infty)$, $(-\frac{1}{2}, 1)$,
$[-\frac{1}{2}, \frac{1}{2}]$, $[\frac{1}{2}, +\infty)$, $(-\infty, -1)$,
$(\frac{-3-\sqrt{33}}{2}, \frac{-3-\sqrt{17}}{2}) \cup (\frac{-3+\sqrt{17}}{2}, \frac{-3+\sqrt{33}}{2})$, $[-4, 1] \cup (6, +\infty)$, $[-1, 1]$.

1.27 $(-\infty, 0]$, nessuna soluzione, $(\frac{4}{5}, \frac{\sqrt{17}-1}{2})$,
nessuna soluzione, $(-3, -\frac{4}{7}) \cup (\frac{4}{7}, 3)$, $(-\infty, -2)$.

1.29 $x = \frac{5}{4}$, $x = \frac{13+\sqrt{13}}{2}$, nessuna soluzione, $x = \frac{1}{4}$, $x = \frac{5-\sqrt{13}}{2}$, $x = \frac{9+\sqrt{17}}{2}$.

1.30 Tutti i reali sono soluzione, $x = 2$, $x = \pm\frac{3}{4}$.

1.31 $(-\infty, -2)$, nessuna soluzione, $(2, +\infty)$,
$[-2, 1]$, $[1, +\infty)$, $[-\frac{5}{2}, 2]$,
$[-1, \frac{5}{4})$, $[3, \frac{13+\sqrt{13}}{2}]$, $(-\infty, \frac{1}{3}]$.

1.32 $(-\infty, -1] \cup (1, +\infty)$, $(-\infty, -3) \cup (-2, 0)$, $(-3, 0]$, $(-\frac{9}{2}, \frac{5}{6})$, $(-\infty, 0) \cup (0, \frac{7}{3}) \cup (5, +\infty)$.

1.33 $(-\infty, -1] \cup (1, +\infty)$, $(-3, -2] \cup [0, +\infty)$, $[-1, 0) \cup [1, +\infty)$, $[-1, 1]$, $(-\infty, 1] \cup [2, +\infty)$,
tutti i reali eccetto 2, $(-\infty, 0] \cup (\frac{4}{3}, 3]$, tutti i reali eccetto 1 e 4, $(-3, +\infty)$,
$[-1 - \sqrt{11}, -1 + \sqrt{11}]$, $(-\infty, -2] \cup [\frac{2}{3}, +\infty)$, tutti i reali positivi, tutti i reali eccetto 3,
tutti i reali, tutti i reali eccetto -4, tutti i reali eccetto $4 \pm \sqrt{6}$, $(-1, +\infty)$, $[0, +\infty)$.

CAPITOLO 3

3.1 0 minimo, 2 massimo; 0 estremo inferiore, 2 massimo; 1 minimo, 5 estremo superiore; $-\infty$ estremo inferiore (insieme illimitato inferiormente) e 5 estremo superiore; -1 minimo e $+\infty$ etsremo superiore (insieme illimitato superiormente).

3.2 $f(0) = f(3) = \sqrt{2}$, $f(2) = f(3) = 0$.

3.4 Funzione non invertibile, per $y \in [-1, +\infty)$ (immagine) soluzioni $x = \pm\sqrt{1+y}$ per l'equazione $x^2 - 1 = y$; $\frac{13}{5y} + \frac{4}{5}$ per $y \neq 0$; $\frac{y+1}{y-1}$ per $y \neq 1$; $\frac{1}{2} - \frac{y}{12}$ per y reale qualsiasi; $\frac{2(y-7)}{y-5}$ per $y \neq 5$.

3.8 $-5, \mp\infty$; $0, \pm\infty$; $-\frac{3}{2}, \mp\infty$; $0, \pm\infty$; $\mp\infty, \frac{21}{4}$; $0, \pm\infty$; $1, \frac{6}{5}$.

3.9 $\frac{1}{4}$, $2\sqrt{2}$, $\frac{4}{3}$, $\frac{1}{2}$, stesso del secondo.

3.11

$+\infty$ a $\pm\infty$, $-\infty$ a $0-$ e $1+$; $+\infty$ a $\pm\infty$. $1/2$ a $\pm\infty$, $\pm\infty$ a $3/2\pm$; 1 a $\pm\infty$, 0 a $0-$, $+\infty$ a $0+$; $\pm\infty$ a $\pm\infty$, 0 a $0+$, $-\infty$ a $0-$ (forma indeterminata);

e a $\pm\infty$, ∞ a $-1-$, 0 a $-1+$. 1 a $\pm\infty$, 0 a $2-$, $+\infty$ a $2+$; 0a $-\infty$, 1 a $+\infty$, $\pm\infty$ a $1\pm$; 0 a -1, $+\infty$ a $+\infty$. 0 a $-\infty$, $+\infty$ a $1-$;

1 a $\pm\infty$, $+\infty$ a $-1-$, 0 a $0+$; 1 a $\pm\infty$, 0 a $-1-$, $+\infty a$ a $1+$; 0 a ±1; $+\infty$ a ±1;

0 a $\pm\infty$. $\mp\infty$ a $2\pm$; 0 a $\pm\infty$, $-1/2$ a -1 (singolarita eliminabile), $\pm\infty$ a $1\pm$; 0 a $-\infty$, $+\infty$ a $+\infty$, $\pm\infty$ a $2\pm$; $+\infty$ a $-\infty$, 0 a $+\infty$;

$-\infty$ a $-\infty$, 0 a $+\infty$; $\pm\infty$ a $\pm\infty$, 0 a $0+$, $-\infty$ a $0-$ (forma indeterminata); $+\infty$ a $\pm\infty$, 0 a $0+$, $+\infty$ a $0-$ (forma indeterminata); 0 a $-\infty$, $-\infty$ a $0-$; $-\infty$ a $-2+$ e $2-$;

0 a $0+$, $-\infty$ a $+\infty$; $+\infty$ a $2+$, $-\infty$ a $+\infty$; ±1 a $\pm\infty$, $\pm\infty$ a $0\pm$; $+\infty$ a $-\infty$, 0 a $+\infty$; 0 a $-\infty$, $+\infty$ a $+\infty$;

0 a $\pm\infty$; 0 a $-\infty$, $+\infty$ a $+\infty$, $\pm\infty$ a $0\pm$; $+\infty$ a $\pm\infty$; $+\infty$ a $\pm\infty$, $-\infty$ a $-1/2-$ e $0+$;

0 a $-1+$, $+\infty$ a $+\infty$; $\log 2$ a $1+$, $+\infty$ a $+\infty$; $+\infty$ a $-3/2+$, $-\infty$ a $+\infty$; 0 a $0+$, 0 a $+\infty$;

2 a $\pm\infty$, $+\infty$ a $0\pm$; e^{-1} a $\pm\infty$, 0 a $1-$, $+\infty$ a $1+$; $-\infty$ a $0+$, 0 a $+\infty$ (forma indeterminata); $\pm\infty$ a $\pm\infty$, 0 a $0-$, $-\infty$ a $0+$; 0 a $\pm\infty$, $+\infty$ a 0.

3.14 0, 0, 1, 1, 1, 1.

3.15 1, 1, e, e^a, $\frac{7}{3}$, 2.

3.16 $-\infty$, 0, 0, $+\infty$, $\frac{\sqrt{2}}{2}$, 0.

CAPITOLO 4

4.2 $-\frac{\pi}{x^2}$, 0, $\frac{-x-x\tan^2 x-1+\tan x}{x^2}$, $2\sin(x) + x\cos x$,
$\frac{1-\cos x-x\sin x}{(1-\cos x)^2}$, $\frac{2e^x}{(1-e^x)^2}$, $-\frac{\sin x+\cos x}{e^x}$, $\frac{\cos x-2x\sin x}{2\sqrt{x}}$,
$\frac{a}{\cos^2(ax)}$, $-be^{-bx}$, $-\frac{2}{x^2\cos^2(2/x)}$, $5\cos(5x)$, $2\cos^2(x) - 1$, $2\sin x\cos x$.

4.3 $-\frac{2}{x^3}$, $-\frac{n}{x^{n+1}}$, $\frac{1}{3x^{2/3}}$, $\frac{1}{2\sqrt{x}}$, $\frac{2}{3x^{1/3}}$, $-\frac{1}{2x^{3/2}}$, uguale, $-\frac{1}{3x^{4/3}}$, $\frac{1}{2\sqrt{x-1}}$,
$-\frac{1}{(2-3x)^{2/3}}$, $-\frac{1}{|x-1|\sqrt{x^2-1}}$, $\frac{2}{5x^{3/5}}$, $e^x(1+x)$, $2e^x(xe^x-1)(1+x)$, $2\sin x\cos x$, $2^x\log 2$,
$(\sin x)^x(\log(\sin x) + x\cot x)$, $-\frac{2x}{(2-3x^2)^2}$, $\frac{1}{2\sqrt{x(1-x)}}$, $\frac{2xe^x+10e^x-1}{(x+6)^2}$, $\frac{\sin x}{\cos^2 x\cos^2(1/\cos x)}$,
$-\frac{1}{2x}$, $\frac{2}{1-x^2}$, $-\frac{1}{1+x^2}$, $\log x + 1$, $2\frac{3-4x}{2x+5} - 4\log(2x+5)$,
$1 + e^{1/x}(1-\frac{1}{x})$, $\frac{e^x(x-1)}{x^2}$, $-\frac{e^{1/(x-1)}}{(x-1)^2}$, $2x\log(2-6x) - \frac{3x^2}{1-3x}$, $-\frac{2e^{1/x}}{x^2(e^{1/x}+1)^2}$,
$\frac{3x^2+\cos x}{2\sqrt{x^3+\sin x}}$, $-\frac{1}{\sqrt{1+x^2}}$, $\frac{2}{\sqrt{4x^2+1}}$.

4.6

2, $+\infty$, 1, $+\infty$ (non indeterminato),
0, $+\infty$, $\frac{1}{2}$,
$-\frac{1}{2}$, 1, 2,
$+\infty$, $-\infty$, $-\infty$ (non indeterminato), 1

1, 1, $-\infty$ (non indeterminato), uguale,
1, -1 (non indeterminato), -1, uguale,
$\frac{1}{7}$, $\frac{1}{2}$ (non indeterminato), -2, 3,
$\frac{3}{2}$, -2, 2, 0 (a $+\infty$) e -1 (a $-\infty$, non indeterminato),
1 (non indeterminato), $\frac{1}{2}$, $-\frac{1}{12}$, $-\infty$.
4.7
1, 0, 0, 0.