SPC - ch. 1B EXAM - review solns - p. 1

(1) FXN is decreasing (going downhill as you read from left to right) for $(-\infty, -1)$ and increasing (going uphill as you read from left to right) for $(-1, \infty)$

(A)

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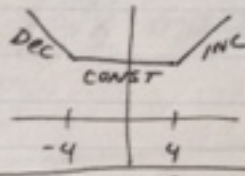
(2) decreasing: $(-\infty, -4)$
constant: $(-4, 4)$
increasing: $(4, \infty)$



(C)

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(3) $F(x) = \frac{5x-9}{3x-2}$

switch x and y

$x = \frac{5y-9}{3y-2}$

$x(3y-2) = 5y-9$

$3xy - 2x = 5y - 9$

move all y's to LHS and all non-y's to RHS...

$3xy - 5y = 2x - 9$

factor out the y!!

$y(3x-5) = 2x-9$

$y = \boxed{\frac{2x-9}{3x-5} = F^{-1}(x)}$

(C)

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(4) $F(x) = 2x^3 + 5$

(B)

switch the x and y

$x = 2y^3 + 5$

$x - 5 = 2y^3$

$\frac{x-5}{2} = y^3$

$\sqrt[3]{\frac{x-5}{2}} = y$

$\boxed{F^{-1}(x) = \sqrt[3]{\frac{x-5}{2}}}$

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(5) $F(x) = 6x - 3$

switch the x and y

$x = 6y - 3$

$x + 3 = 6y$

$\frac{x+3}{6} = y$

$\boxed{F^{-1}(x) = \frac{x+3}{6}}$

(D)

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(6) $F(x) = \sqrt[3]{\frac{x}{8}} - 8$

switch x and y

$x = \sqrt[3]{\frac{y}{8}} - 8$

$x + 8 = \sqrt[3]{\frac{y}{8}}$

$(x+8)^3 = \frac{y}{8}$

$8(x+8)^3 = y$

$\boxed{F^{-1}(x) = 8(x+8)^3}$

(C)

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(7) local max and local min are the y-values...

max is around $y = 1$ but a little higher...

so (C)

(min is slightly below -3)

SPC- Ch.1B review SOLNS - p.2

(8) $y=(x-11)^2+6$ ← up 6, ↑ right 11 (B)

(9) $y=x^2-13$ ← down 13 (D)

(10) the given graph is $y=\sqrt{x}$ moved RIGHT 5
so −5 on inside (C)
$y=\sqrt{x-5}$

(11) $y=(x-4)^2-2$ shifts $y=x^2$
horizontally RIGHT 4 UNITS
AND vertically DOWN 2 UNITS (B)
SO: 4, right, 2, DOWNWARD

(12) $y=-\sqrt{x+1}$ ← left 1 unit
↑ flip over x-axis
SO 1, LEFT, X (D)

(13) $F(x)=4x^2+4x+3$ $g(x)=4x-6$
$g(F(x))=g(F)=4F-6=4(4x^2+4x+3)-6$
$=16x^2+16x+12-6=\boxed{16x^2+16x+6}$ (B)

(14) $F(x)=x^2+2$ $g(x)=\sqrt{x-9}$
$g(F(x))=g(F)=\sqrt{F-9}=\sqrt{x^2+2-9}$
$=\boxed{\sqrt{x^2-7}}$ (A)

SPC - ch. 1B review solns - p. 3

(15) $F(x) = \frac{x-6}{7}$ $\quad g(x) = 7x+6$

$g(F(x)) = g(F) = 7F+6 = 7\left(\frac{x-6}{7}\right)+6$

$= x-6+6 = \boxed{x}$ (A)

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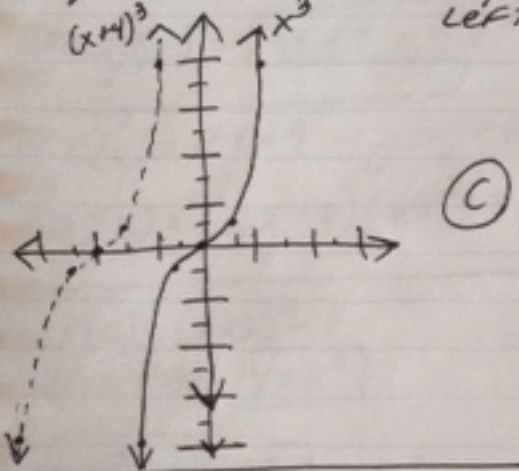
(16) $y = x^3$ AND $y = (x+4)^3$ ← LEFT 4



(C)

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(17) $y(x) = \begin{cases} \text{(A)}\ 6x+4, & x<0 \\ \text{(B)}\ 5x^2-5, & x \geq 0 \end{cases}$

(line w/ (A) slope ↗ UNTIL $x=0$)

(smile after $x=0$ ↺)

↑ so either A or D ... AND line is supposed to have open circle @ $x=0$ so (A)

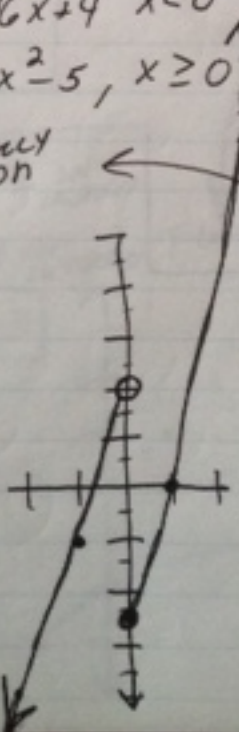
OR ACTUALLY graph

(A)

x	6x+4
-2	-8
-1	-2
open 0	4

(B) closed

x	$5x^2-5$
0	-5
1	0
2	15



SPC - ch.1B review sols - p. 4

(18) $f(x) = 3x+1 \quad g(x) = 5x-4$

$\frac{f}{g} = \boxed{\frac{3x+1}{5x-4}}$ — $5x-4 \neq 0$, $\boxed{x \neq 4/5}$ (C)

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(19) $f(x) = 2x+7 \quad g(x) = 4x^2$

$(f+g)(x) = \boxed{2x+7+4x^2}$ (C)

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(20) $f(x) = 2x+9 \quad g(x) = 6x^2$

$(fg)(x) = (2x+9)(6x^2) = \boxed{12x^3+54x^2}$ (B)

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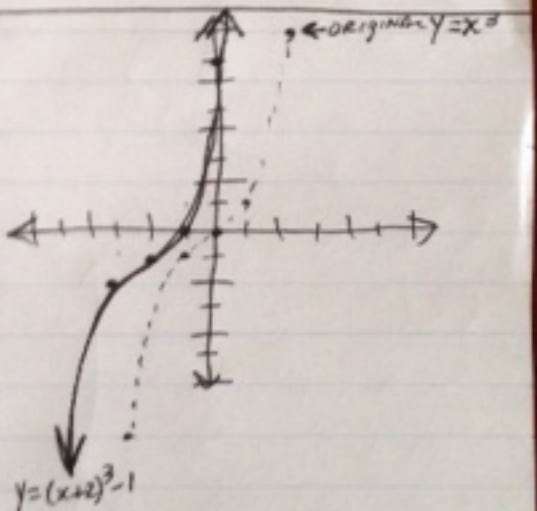
(21) $f(x) = (x+2)^3 - 1$

BASIC FXN: $\boxed{y = x^3}$

TRANSFORMATIONS
1. LEFT 2
2. DOWN 1



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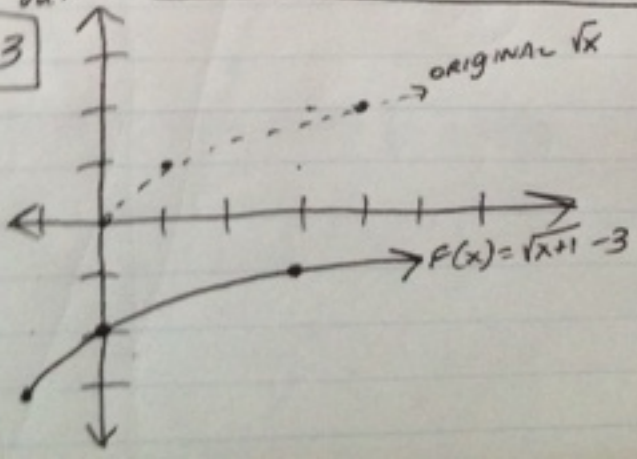
(22) LEFT 1 = +1 ON INSIDE

DOWN 3 = −3 ON OUTSIDE

$\boxed{f(x) = \sqrt{x+1} - 3}$



SPC - ch.1B review solns - p.5

$$g(x) = \begin{cases} \text{(A)}\ 1-2x, & x < -3 \\ \text{(B)}\ -3x-2, & -3 \le x \le 1 \\ \text{(C)}\ x^2-3, & x > 1 \end{cases}$$

break points are $x=-3$ AND $x=1$ (places where graph switches from one fxn to another)

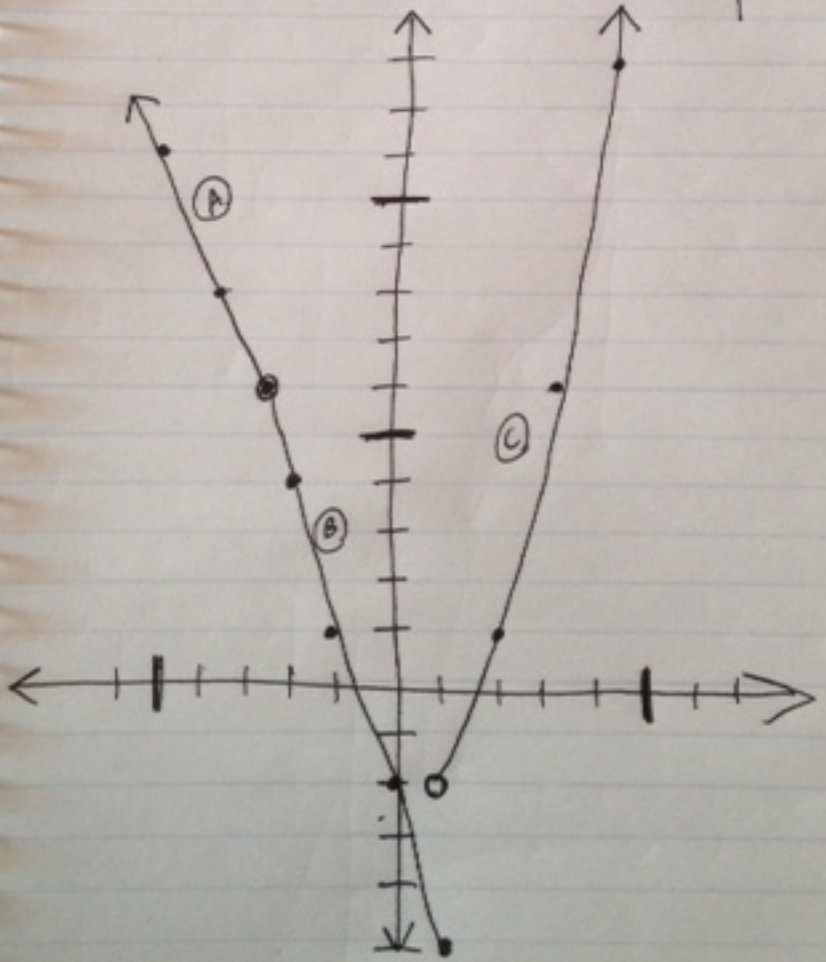
Tables:

(A)

x	1-2x
-5	11
-4	9
-3 (open)	7

(B)

x	-3x-2
-3 (closed)	7
-2	4
0	-2
1 (closed)	-5

(C)

x	x^2-3
1 (open)	-2
2	1
3	6
4	13