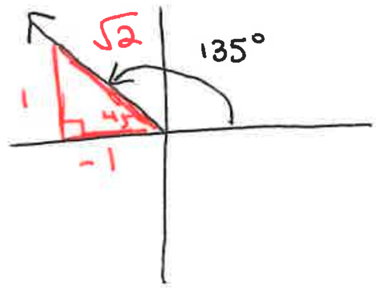
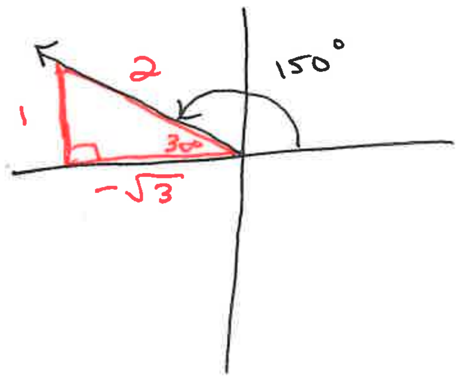
#1

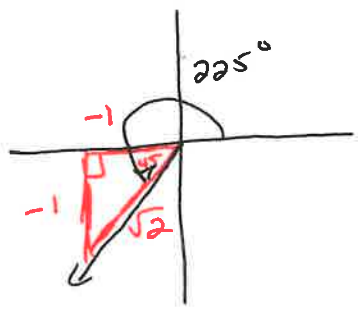
1. $\cos 135° = \frac{-1}{\sqrt{2}}$



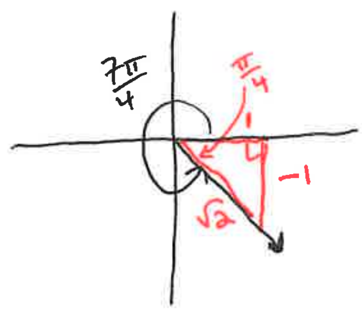

2. $\tan 150° = \frac{1}{2}$



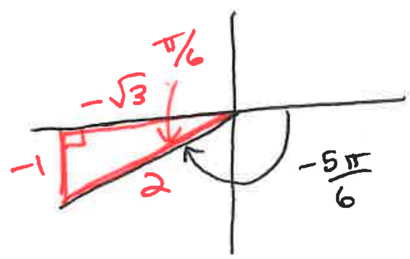

3. $\sin 225° = \frac{-1}{\sqrt{2}}$



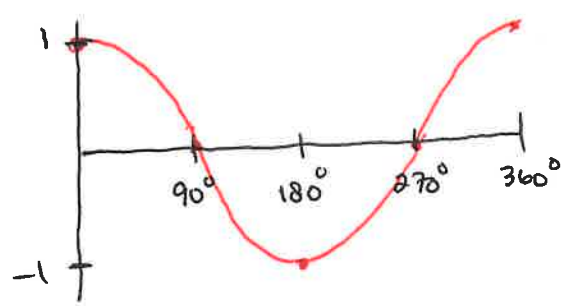

4. $\cot \frac{7\pi}{4} = -1$




5. $\csc -\frac{5\pi}{6} = -2$




6. $\cos 270° = 0$



#2 p 42-43: 2, 3, 5, 6, 7

2. a. VERTICAL TRANSLATION, UP 8

b. HORIZONTAL TRANSLATION, LEFT 8

c. VERTICAL STRETCH, FACTOR OF 8

d. HORIZONTAL COMPRESSION, FACTOR OF $\frac{1}{8}$

e. REFLECTION OVER X-AXIS, DOWN 1

f. VERTICAL & HORIZONTAL STRETCH, BOTH FACTOR OF 8

6. RIGHT 2, VERTICAL STRETCH BY FACTOR OF 2

$$y = 2\sqrt{3(x-2) - (x-2)^2}$$

#3 p. 50: 1(a,b), 3, 5

NO EVENS

#4 p. 60-62: 2, 3, 5, 7, 9, 23-37 (ODD)

2. $\lim_{x \to 1^-} f(x) = 3$ MEANS THAT FUNCTION $f(x)$ APPROACHES THE VALUE OF 3 AS X APPROACHES 1 FROM THE LEFT.

$\lim_{x \to 1^+} f(x) = 7$ MEANS THAT FUNCTION $f(x)$ APPROACHES THE VALUE OF 7 AS X APPROACHES 1 FROM THE RIGHT.

$\lim_{x \to 1} f(x)$ DOES NOT EXIST BECAUSE IN ORDER TO EXIST, THE LEFT & RIGHT HAND LIMITS MUST BE EQUIVALENT.

\# 5

p 70-71: 2, 15; 16, 17, 23, 24

2. a. $\lim\limits_{x \to 2} [f(x) + g(x)] = -1 + 2 = 1$

b. $\lim\limits_{x \to 0} [f(x) - g(x)] = 2 - \text{DNE} = \text{DNE}$

c. $\lim\limits_{x \to -1} [f(x)\, g(x)] = (1)(2) = 2$

d. $\lim\limits_{x \to 3} \dfrac{f(x)}{g(x)} = \dfrac{1}{0} = +\cancel{\infty} \text{ or } \cancel{-\infty} = \text{DNE}$

0 APPROACHING FROM BOTH SIDES

16. $\lim\limits_{x \to 4} \dfrac{x^2 + 3x}{x^2 - x - 12} \quad \dfrac{28}{0}$ $= \lim\limits_{x \to 4} \dfrac{x(x+3)}{(x-4)(x+3)} = \lim\limits_{x \to 4} \dfrac{x}{x-4} = \text{DNE}$

$\lim\limits_{x \to 4^-} \dfrac{x}{x-4} = -\infty$ $\qquad \lim\limits_{x \to 4^+} \dfrac{x}{x-4} = \infty$

24. $\lim\limits_{x \to 2} \dfrac{2-x}{\sqrt{x+2} - 2} \cdot \dfrac{\sqrt{x+2} + 2}{\sqrt{x+2} + 2} = \lim\limits_{x \to 2} \dfrac{(2-x)(\sqrt{x+2} + 2)}{x + 2 - 4}$

$= \lim\limits_{x \to 2} \dfrac{(-1)(x-2)(\sqrt{x+2} + 2)}{x - 2} = \lim\limits_{x \to 2} (-1)(\sqrt{x+2} + 2)$

$= -4$

#6 p 92: 3, 4, 5, 6, p 72: 61, 66, 67

4. $x = -2$ REMOVABLE DISCONTINUITY

$x = -1$ VERTICAL ASYMPTOTE

$x = 0$ JUMP DISCONTINUITY

$x = 1$ JUMP DISCONTINUITY

6. a. $\lim_{x \to a} f(x)$ DNE AT $a = 5$

AT $a = \infty$ IS ARGUABLE TO SAY EITHER INFINITY OR DNE BECAUSE IT'S NOT FINITE.

b. $f$ IS NOT CONTINUOUS AT $a = 1, 3, 5$

c. $a = 3$ , 1 AGAIN IS ARGUABLE (GRAY AREA)

$\frac{0}{0}$ INDETERMINATE $\qquad$ $\frac{0}{0}$ INDET.

66. $$\lim_{x \to 2} \frac{\sqrt{6-x} - 2}{\sqrt{3-x} - 1} \cdot \frac{\sqrt{3-x} + 1}{\sqrt{3-x} + 1} = \lim_{x \to 2} \frac{(\sqrt{6-x} - 2)(\sqrt{3-x} + 1)}{3 - x - 1}$$

$$= \lim_{x \to 2} \frac{(\sqrt{6-x} - 2)(\sqrt{3-x} + 1)}{2 - x} \cdot \frac{\sqrt{6-x} + 2}{\sqrt{6-x} + 2} =$$

$$= \lim_{x \to 2} \frac{(6 - x - 4)(\sqrt{3-x} + 1)}{(2-x)(\sqrt{6-x} + 2)} = \lim_{x \to 2} \frac{\sqrt{3-x} + 1}{\sqrt{6-x} + 2} = \frac{2}{4}$$

#7 p 92–93 : 19 – 24, 47, 48
20, 22

20. $f(x) = \begin{cases} \dfrac{1}{x+2} & \text{IF } x \neq -2 \\ 1 & \text{IF } x = -2 \end{cases}$

$\lim\limits_{x \to -2^-} f(x) = -\infty$ $\lim\limits_{x \to -2^+} f(x) = \infty$ $f(-2) = 1$

TO BE CONTINUOUS, $\lim\limits_{x \to a^-} f(x) = \lim\limits_{x \to a^+} f(x) = f(a)$.

THIS IS NOT TRUE.

22. $f(x) = \begin{cases} \dfrac{x^2 - x}{x^2 - 1} & \text{IF } x \neq 1 \\ 1 & \text{IF } x = 1 \end{cases}$ $\dfrac{x \cancel{(x-1)}}{(x+1)(x-1)} = \dfrac{x}{x+1}$ IF $x \neq 1$

$\lim\limits_{x \to 1^-} f(x) = \frac{1}{2}$ $\lim\limits_{x \to 1^+} f(x) = \frac{1}{2}$ $f(1) = 1$

$\lim\limits_{x \to 1} f(x) = \frac{1}{2} \neq 1$ $\therefore$ NOT CONTINUOUS

24. $f(x) = \begin{cases} \dfrac{2x^2 - 5x - 3}{x-3} & \text{IF } x \neq 3 \\ 6 & \text{IF } x = 3 \end{cases}$ $\cancel{\dfrac{(2x+1)(x-3)}{x-3}}$

$\lim\limits_{x \to 3} f(x) = 7$ $f(3) = 6$ DISCONTINUOUS

48. $\dfrac{x^2 - 4}{x - 2} = ax^2 - bx + 3$ AT $x = 2$ $\Longrightarrow 4 = 4a - 2b + 3$

$ax^2 - bx + 3 = 2x - a + b$ AT $x = 3$ $\Longrightarrow 6 - a + b = 9a - 3b + 3$

$a = \frac{1}{2}$, $b = \frac{1}{2}$

#8 p.50 : 6, 7, 8, PED : 1, 2, 3, 4, 5

6. a. i. 4.42 m/s ii. 5.35 m/s iii. 6.094 m/s iv. 6.26 m/s v. 6.28 m/s

b. 6.3 m/s

8. (CALCULATOR IN RADIANS)

a. i. 6 cm/s ii. −4.71 cm/s iii. −6.13 cm/s iv. −6.27 cm/s

b. −6.3 cm/s

PEDIATRICIAN CHART (SEE NEXT PAGES FOR DETAILED VISUALS.)

1. $\frac{96-77}{27-7} \approx .95$ cm/mo.

2. $\frac{99-57}{24-0} \approx 1.45$ cm/mo.

3. $\approx .127$ kg/mo.

4. $\approx .467$ kg/mo.

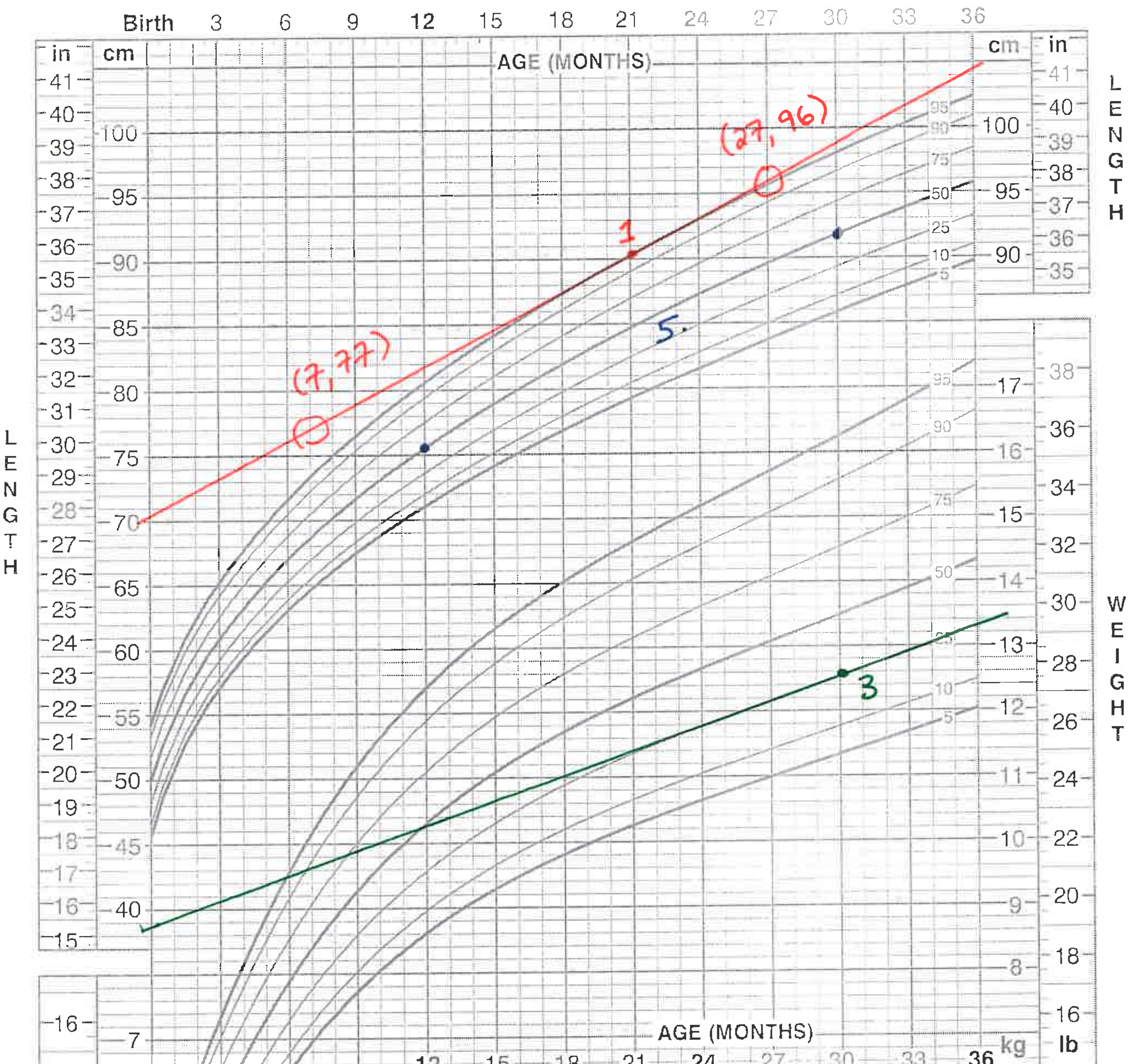
5. $\approx .9$ cm/mo.

Birth to 36 months: Boys

## Length-for-age and Weight-for-age percentiles

NAME ____________________

RECORD # ____________




| Mother's Stature ____________ Father's Stature ____________ | | | Gestational Age: ________ Weeks | | Comment |
|---|---|---|---|---|---|
| Date | Age | Weight | Length | Head Circ. | |
| | Birth | | | | |
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Published May 30, 2000 (modified 4/20/01)

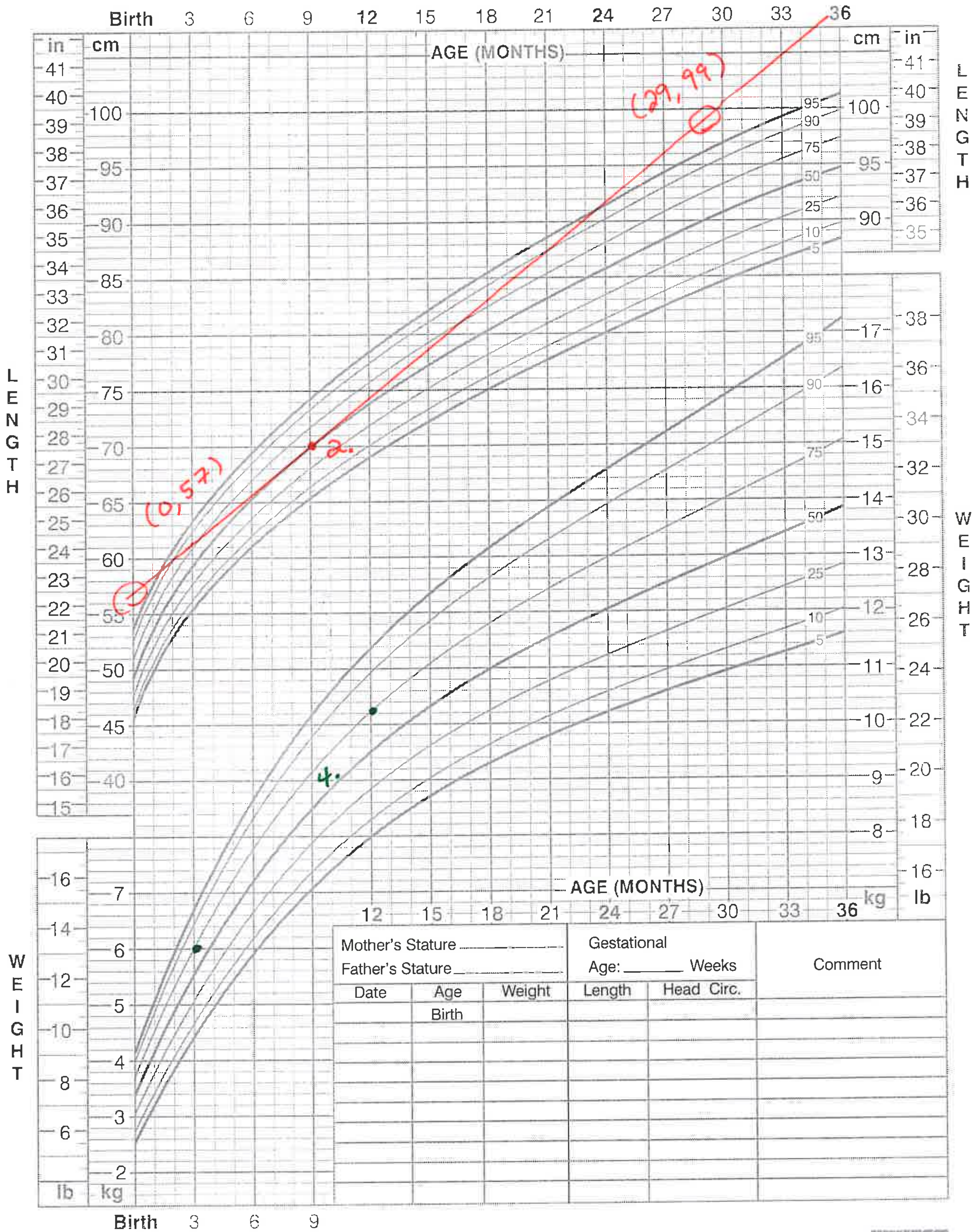
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

Birth to 36 months: Girls

# Length-for-age and Weight-for-age percentiles

NAME ______________________

RECORD # ______________




| Mother's Stature ______ Father's Stature ______ | | | Gestational Age: ______ Weeks | | Comment |
|---|---|---|---|---|---|
| Date | Age | Weight | Length | Head Circ. | |
| | Birth | | | | |
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Published May 30, 2000 (modified 4/20/01).

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

#9 600 ft HEIGHT , 30 ft/s up

$y \rightarrow$ HEIGHT (ft) $x \rightarrow t$ (SECONDS)

1. $y = -16x^2 + 30x + 600$
2. 350 ft.
3. $\approx 7.13$ s
4. $\approx -130$ ft/s
5. $\approx -198$ ft/s
6. $\approx -84.15$ ft/s

---

#10 p 116 : 3, 4

4. $y = x^3 + 1$ AT $(1, 2)$.

i. DEFN 1

$$y'(1) = \lim_{x \to 1} \frac{(x^3+1) - (1^3+1)}{x-1}$$

$$= \lim_{x \to 1} \frac{x^3 - 1}{x - 1} = \lim_{x \to 1} \frac{(x-1)(x^2+x+1)}{x-1}$$

$$= \lim_{x \to 1} x^2 + x + 1 = 3$$

ii. EQTN 2

$$y'(1) = \lim_{h \to 0} \frac{f(1+h) - f(1)}{(1+h) - 1}$$

$$= \lim_{h \to 0} \frac{\left[(1+h)^3 + 1\right] - 2}{h}$$

$$= \lim_{h \to 0} \frac{\left[h^3 + 3h^2 + 3h + 2\right] - 2}{h}$$

$$= \lim_{h \to 0} \frac{h^3 + 3h^2 + 3h}{h}$$

$$= \lim_{h \to 0} h^2 + 3h + 3 = 3$$

#11 p 116: 13 – 18, 27, 28, 43–48

14, 16 44, 46

14. $s = \frac{1}{2}t^2 - 6t + 23$

ft s

a. i AVG. VEL. $= \dfrac{s(8) - s(4)}{8 - 4}$

$= \dfrac{7 - 7}{4} = 0 \ \frac{ft}{s}$

ii. AVG VEL $= 1 \ \frac{ft}{s}$

iii. $= 3$ ft/s

iv. $= 8 \ \frac{ft}{s}$

b. OPTIONS HERE ... DEFN OF DERIV OR CALCULATOR HACK.

i. $s'(8) = v(8) = \lim\limits_{x \to 8} \dfrac{f(x) - f(8)}{x - 8} = \lim\limits_{x \to 8} \dfrac{(\frac{1}{2}x^2 - 6x + 23) - 7}{x - 8}$

$= \lim\limits_{x \to 8} \dfrac{\frac{1}{2}(x^2 - 12x + 32)}{x - 8} = \lim\limits_{x \to 8} \dfrac{\frac{1}{2}(x-8)(x-4)}{x-8}$

$= \lim\limits_{x \to 8} \frac{1}{2}(x - 4) = 2$

ii. $s'(8) = v(8) = \lim\limits_{h \to 0} \dfrac{f(8+h) - f(8)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\left(\frac{1}{2}(8+h)^2 - 6(8+h) + 23\right) - (7)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\left(\frac{1}{2}(64 + 16h + h^2) - 48 - 6h + 23\right) - 7}{h} = \lim\limits_{h \to 0} \dfrac{\frac{1}{2}h^2 + 2h}{h}$

$= \lim\limits_{h \to 0} \frac{1}{2}h + 2 = 2$

iii. $s'(8) = v(8) \approx \dfrac{s(8.001) - s(8)}{8.001 - 8} \approx 2$

16. a. COMPARE SLOPES OF RUNNERS A & B, AND DESCRIBE THESE SLOPE VALUES IN TERMS OF VELOCITY OR SPEED.

b. SINCE SLOPE OF A d v t RELATIONSHIP IS VELOCITY, ABOUT WHERE DO YOU THINK THE VELOCITY IS THE SAME.

18. THESE ARE ALL ESTIMATES. PLEASE DON'T WORRY IF YOUR ANSWERS ARE SLIGHTLY OFF COMPARED TO MINE. IT'S THE CONCEPTS THAT ARE IMPORTANT HERE.

a. $\approx 11.25$

b. MANY OPTIONS... HERE IS ONE $[20, 45]$. SEE IF YOU CAN FIND ANOTHER.

c. $\approx \frac{-200}{30}$ THIS REPRESENTS THE SLOPE OF THE SECANT LINE WHEN THINKING GEOMETRICALLY.

d. $\approx 25$

e. TRICKY QUESTION... THINK ABOUT THIS ONE FOR A BIT.
THE ANSWER IS NO $f'(10) \not> f'(30)$.
EVEN THOUGH $f'(10)$ IS STEEPER THAN $f'(30)$,
BOTH OF THESE VALUES ARE NEGATIVE.

f. YES. COMPARE TANGENT LINE TO SECANT LINE AND EXPLAIN IN YOUR OWN WORDS

28. $y + 3 = 4(x-5)$

44. $f(x) = 2^x$ , $a = 3$

46. $f(x) = \frac{1}{x}$ , $a = \frac{1}{4}$

48. $f(\theta) = \sin\theta$ , $a = \frac{\pi}{6}$

---

#12

1. $y = -16t^2 + 60t + 150$

2. USE EITHER VERSION OF DEFN OF DERIV. TO PRACTICE.

$v = -32t + 60$

$v(1) = 28$ ft/s $\quad v(2) = -4$ ft/s $\quad v(3) = -36$ ft/s

$v(4) = -68$ ft/s $\quad v(5) = -100$ ft/s $\quad v(6) = -132$ ft/s

3. AT ABOUT 1.875 SECONDS

4. ABOUT 71.25 ft

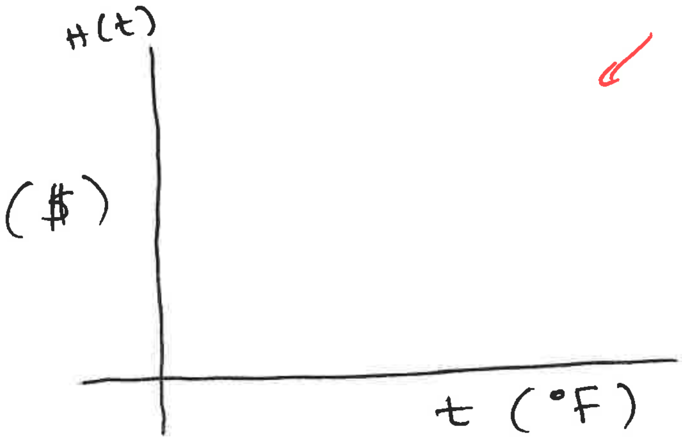
5. ABOUT 3.985 SECONDS

6. ABOUT $-37.641$ ft/s

#13. P 118 : 50, 52, 54, 56

I LIKE TO SET UP A GRAPH FOR QUESTIONS LIKE THESE TO HELP GUIDE MY THINKING..

50.




THINK ABOUT WHAT THE GRAPH WOULD LOOK LIKE A SKETCH IT.

AS THE OUTSIDE TEMP INC., IT WOULD NOT COST AS MUCH TO HEAT.

a. H'(58) REPRESENTS ~~HOW QUICKLY~~ THE RATE OF CHANGE OF THE COST OF HEATING AND OFFICE BUILDING W.R.T. THE CHANGE IN THE OUTSIDE TEMPERATURE MEASURED IN DOLLARS PER DEGREE FAHRENHEIT WHEN THE OUTSIDE TEMPERATURE IS 58 °F.

* IMPORTANT WORDS/THINGS TO INCLUDE.

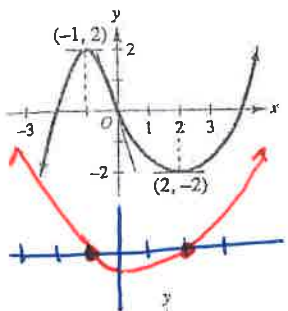
52, 54, 56 PRACTICE IN YOUR OWN WORDS

#14 P 128-129 : 1-11 (ODD)

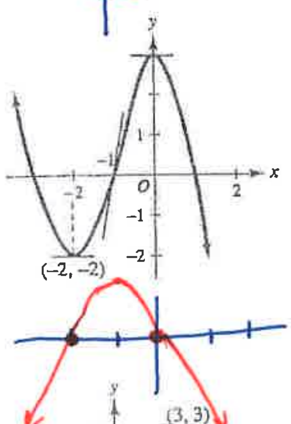
#15.



19.




20.

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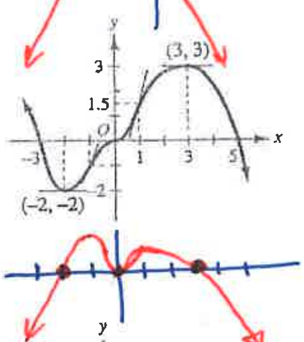


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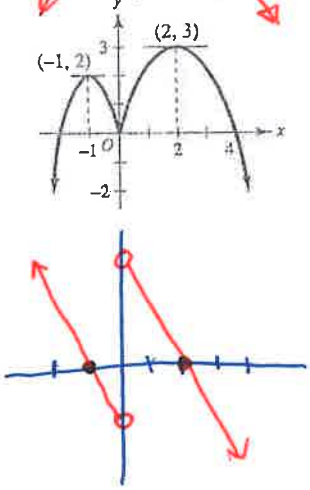


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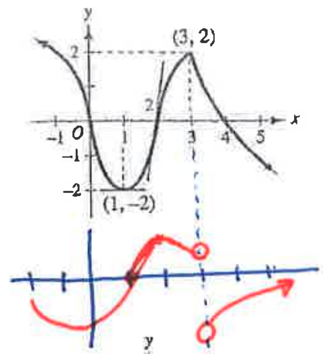


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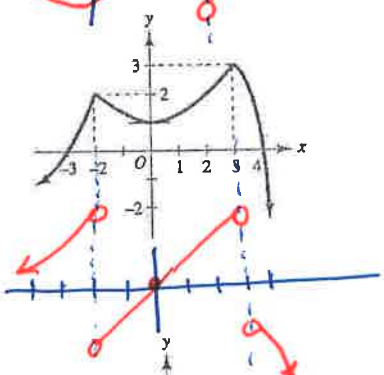


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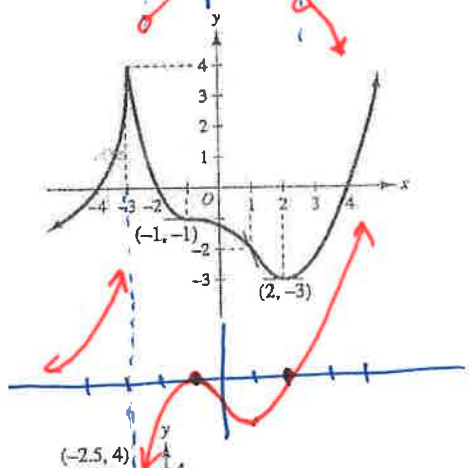
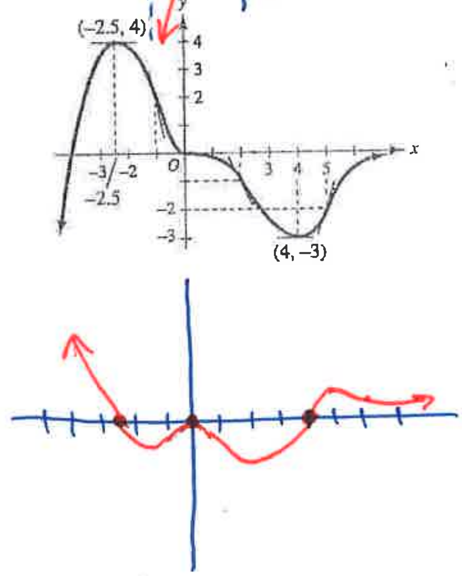



26.



#16 p 129 - 130 : 34, 45, 47, 49

34. $m = \frac{\Delta y}{\Delta x} \Rightarrow N'(t) = \frac{\Delta N(t)}{\Delta t}$

a. $N'(t)$ REPRESENTS THE RATE OF CHANGE OF COSMETIC SURGIES WITH RESPECT TO YEARS MEASURED IN THOUSANDS OF SURGERIES PER YEAR.

b. USE AVERAGE RATES OF CHANGE TO ESTIMATE THE INSTANTANEOUS RATE OF CHANGE.

FOR INSTANCE $N'(2002) \approx \frac{N(2004) - N(2000)}{2004 - 2000}$

| $t$ | $N'(t)$ |
|---|---|
| 2000 | -301.5 |
| 2002 | 492.5 |
| 2004 | 1060.25 |
| 2006 | 856.75 |
| 2008 | 605.75 |
| ↓ | ↓ |

c. PLOTTING POINTS TAKE YOUR TIME

d. THERE IS A BETTER OPTION THAN OUR METHOD FROM b.

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#17 p 143-147 : 1-25 (odd)

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#18 p 143-147 : 79-89 (odd)

#19

$s(t) = \frac{1}{3}t^3 - \frac{7}{2}t^2 + 10t - 4$

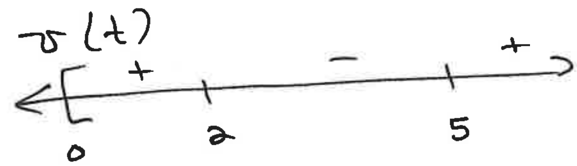
a. $s(0) = -4$

$s(4) = 4/3$

$s(7) = 8.833$

b. $v(t) = t^2 - 7t + 10$

$= (t-5)(t-2)$

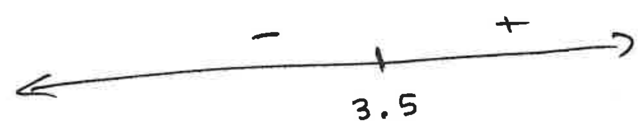



$v(t) = 0$ AT $t = 2, 5$

MOVING RIGHT : $[0, 2) \cup (5, \infty)$

MOVING LEFT : $(2, 5)$

c. $a(t) = 2t - 7$




$a(t) = 0$ AT $t = 3.5$

SPEEDING UP : $(2, 3.5) \cup (5, \infty)$

SLOWING DOWN : $[0, 2) \cup (3.5, 5)$

#20 p 154: 1-21 (odd), 27, 29, 36, 38, 39, 61, 62

36. $f(t) = \sec t$

$f'(t) = \sec t \ \tan t$

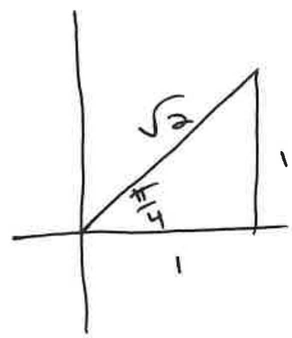
$f''(t) = \sec t \cdot \sec^2 t + \tan t \,(\sec t \ \tan t)$

$= \sec^3 t + \sec t \cdot \tan^2 t$

$f''\left(\frac{\pi}{4}\right) = \left(\sec\frac{\pi}{4}\right)^3 + \sec\left(\frac{\pi}{4}\right) \cdot \left(\tan\frac{\pi}{4}\right)^2$

$= (\sqrt{2})^3 + \sqrt{2} \cdot 1$

$= 2^{3/2} + \sqrt{2}$




CHECK USING MATH 8

$\sec\frac{\pi}{4} = \sqrt{2}$

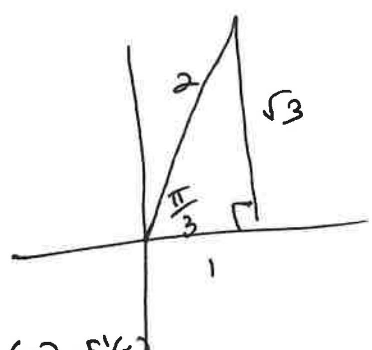
$\tan\frac{\pi}{4} = 1$

38. $g(x) = f(x) \cdot \sin(x)$

$g'(x) = f(x) \cdot \cos(x) + \sin(x) \cdot f'(x)$

$g'\left(\frac{\pi}{3}\right) = (4)\left(\frac{1}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)(-2)$

$= 2 - \sqrt{3}$




$h(x) = \dfrac{\cos x}{f(x)}$ $\qquad h'(x) = \dfrac{f(x)\,(-\sin x) - \cos(x) \cdot f'(x)}{[f(x)]^2}$

$h'\left(\frac{\pi}{3}\right) = 4\left(-\frac{\sqrt{3}}{2}\right) - \left(\frac{1}{2}\right)(-2) = -2\sqrt{3} + 1$

#62.

$y = x \cdot \sin x$

$y' = x \cdot \cos x + \sin x$

$y'' = x(-\sin x) + \cos(x) \cdot 1 + \cos x$

$= -x \sin x + 2\cos x$

$y''' = -x \cdot \cos x + \sin x(-1) - 2\sin x$

$= -x \cos x - 3\sin x$

KEEP GOING FOR A FEW MORE. YOU SHOULD BE ABLE TO SEE A REPEATING PATTERN IN GROUPS OF FOUR.

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#21 ALL ODD

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#22 p 163: 75, 76

76. THIS IS VERY SIMILAR TO ASSIGNMENT #20: 62 (ABOVE)

YOU CAN ALSO USE THE LITTLE CALCULATOR ON Q 1 ASSIGNMENTS PAGE TO CHECK YOUR ANSWER.

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#23 p 169: 1-13 (ODD)

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#24 p 169-170: 15-21 (ODD), 25-29 (ODD), 37, 39