MID-TERM REVIEW *Worksheet Package* KEY

Part A:

1. The Calculus 12 Mid-Term test is a cumulative exam based on the concepts in Unit I, II & III. Since there was no assessment for Unit III (Limits), the Mid-Term will consist of a higher percentage compared to Unit I & II. As it is a cumulative exam it may only be written once!

2. Go over your Unit I and Unit II tests paying special attention to your mistakes and questions that you feel that you did not fully understand.

Part B: ***DO NOT SIMPLIFY PRODUCT or QUOTIENT RULE QUESTIONS

1. Find the first derivative of each of the following functions:

a) $y=8x^5-3x^7+\frac{2}{3}x^6-5x$

$y'=40x^4-21x^6+4x^5-5$

b) $f(x)=4\pi x^5-2\pi^3+6\pi^2x^5$

$f'(x)=20\pi x^4+30\pi^2x^4$

c) $h(x)=ax^2+b^2x^3+c^3$

$h'(x)=2ax+3b^2x^2$

d) $y=\frac{5}{x^2}-6x^{-3}+\frac{2}{x}-5$ RW $5x^{-2}-6x^{-3}+2x^{-1}$

$y'=-10x^{-3}+18x^{-4}-2x^{-2}$

e) $y=6\sqrt{x}-\frac{5}{\sqrt{x}}+\frac{2}{\sqrt[3]{x}}-\frac{3}{4\sqrt{x}}$ RW $6x^{1/2}-5x^{-1/2}+2x^{-1/3}-\frac{3}{4}x^{-1/2}$

$y'=3x^{-1/2}+\frac{5}{2}x^{-3/2}-\frac{2}{3}x^{-4/3}+\frac{3}{8}x^{-3/2}$

$\boxed{y'=3x^{-1/2}+\frac{23}{8}x^{-3/2}-\frac{2}{3}x^{-4/3}}$

f) $p(x)=\frac{-2x^3}{x-3x^2}$ $\frac{T}{B}$ $\frac{BT'-B'T}{B^2}$

$p'(x)=\frac{(x-3x^2)(-6x^2)-(1-6x)(-2x^3)}{(x-3x^2)^2}$

g) $y=\underset{F}{(2x^2+3)}\underset{S}{(4x-5)}$ $FS'+F'S$

$y'=(2x^2+3)(4)+(4x)(4x-5)$

h) $(x^2-5x+7)^3$

$3(x^2-5x+7)^2\cdot(2x-5)$

2. If $y=8x^6-7x^2+5x$ find: $48x^5-14x+5$

a) $\frac{d^2y}{dx^2}$ b) $\left(\frac{dy}{dx}\right)^2$ c) y'' d) $\frac{d^3y}{dx^3}$

$= 240x^4-14$

$(48x^5-14x+5)^2$

Same as a)

$960x^3$

3. If $y=5K^4x^3-2mx^2+6K$ find:

a) $\frac{dy}{dx}$ b) $\frac{dy}{dK}$ c) $\frac{dy}{dp}$ d) $\frac{dy}{dm}$

$15k^4x^2-4mx$

$20k^3x^3+6$

0

$-2x^2$

4. Find the first derivative of each of the following:

a) $y=\sqrt{5x^2-7x}$ $(5x^2-7x)^{1/2}$

$y'=\frac{1}{2}(5x^2-7x)^{-1/2}(10x-7)$

b) $y=(x^2-1)^3(2x+5)^2$ $Fs'+F's$

$y'=(x^2-1)^3\cdot(2(2x+5)(2))+3(x^2-1)^2(2x)(2x+5)^2$

c) $f(x)=\frac{4x^2}{(1-3x^3)^2}$ $\cdot (1-3x^3)^{-2}$

$f'(x)=(4x^2)(-2(1-3x^3)^{-3}(-9x^2))+(8x)(1-3x^3)^{-2}$

d) $y=\frac{1}{\sqrt{4-u^2}}$ $(4-u^2)^{-1/2}$

$y'=-\frac{1}{2}(4-u^2)^{-3/2}(-2u)$

e) $y = 4m^2(3m-2)^5$

F S

$y' = 4m^2 \cdot (5(3m-2)^4(3)) + 8m(3m-2)^5$

f) $h(x) = \left(x + \frac{1}{\sqrt{x}} - \frac{2}{\sqrt[3]{x}}\right)$

$x + x^{-1/2} - 2x^{-1/3}$

$h'(x) = 1 - \frac{1}{2}x^{-3/2} + \frac{2}{3}x^{-4/3}$

g) $p(x) = \sqrt{\sqrt{x}}(2x - 3x^2)^4$

$p'(x) = x^{1/2} \cdot (4(2x-3x^2)^3(2-6x)) + \frac{1}{2}x^{-1/2}(2x-3x^2)^4$

h) $y = \left(\frac{x^2-2}{x^2+2}\right)^2$

$2\left(\frac{x^2-2}{x^2+2}\right)^1$

$\frac{BT' - B'T}{B^2}$

See below

$$y' = 2\left(\frac{x^2-2}{x^2+2}\right)\left(\frac{(x^2+2)(2x) - (2x)(x^2-2)}{(x^2+2)^2}\right)$$

$2 \cdot \frac{-1}{3}$ $\quad -\frac{2}{3}$ $\quad 3 \cdot 2 - 2(-1)$ $\quad 6+2$ $\quad -\frac{2}{3} \cdot \frac{8}{9}$ $\quad -\frac{16}{27}$

5. If $s(t) = 6t^4 - 8t + 9$ is a position function describing motion in a straight line, find the velocity and acceleration as functions of time t.

$v(t) = 24t^3 - 8$

$a(t) = 72t^2$

6. If $x^2 + y^2 = z^2$ and $\frac{dx}{dt} = -3$, $\frac{dy}{dt} = 5$, $x = 3$ and $y = -4$, find $\frac{dz}{dt}$.

$z = \sqrt{3^2 + (-4)^2}$

$z = 5$

$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 2z\frac{dz}{dt}$

$2(3)(-3) + 2(-4)(5) = 2(5)\frac{dz}{dt}$

$-18 - 40 = 10\frac{dz}{dt}$

$\frac{dz}{dt} = -5.8$

7. How fast is the radius of a circular oil slick changing when the radius is 10 m and the area is increasing at a rate of 100 m²/s ?

8

$A = \pi r^2$ $\quad r = 10$ $\quad \frac{dA}{dt} = 100$ $\quad$ Find $\frac{dr}{dt}$ @ $r=10$

$\frac{dA}{dt} = 2\pi r\frac{dr}{dt} \Rightarrow 100 = 2\pi(10)\frac{dr}{dt}$

$\frac{dr}{dt} = \frac{5}{\pi}$ m/s

7

8. *Find the first derivative of each of the following functions:*

a) $y = 4x^2 + 2y^2 + 8$

$y' = 8x + 4yy'$

$y' - 4yy' = 8x$

$\dfrac{y'(1-4y)}{1-4y} = \dfrac{8x}{1-4y}$

$y' = \dfrac{8x}{1-4y}$

b) $y = 6xy^2$

F S

$y' = (6x)(2yy') + (6)(y^2)$

$y' = 12xyy' + 6y^2$

$y' - 12xyy' = 6y^2$

$y'(1-12xy) = \dfrac{6y^2}{1-12xy}$

$y' = \dfrac{6y^2}{1-12xy}$

c) $f(x) = \cos(2x^4)$

$f'(x) = -\sin(2x^4)(8x^3)$

$f'(x) = -8x^3 \sin(2x^4)$

d) $h(x) = (\sin^4(2x^2 - 5x))$ ✓

$h'(x) = 4(\sin(2x^2 - 5x))^3 \cdot \cos(2x^2 - 5x)(4x - 5)$

e) $m(x) = x\sin x^2$

F S

$(x)(\cos(x^2)(2x)) + (1)\sin x^2$

$m'(x) = 2x^2\cos(x^2) + \sin(x^2)$

f) $y = \ln(2x^2 - 5x)$

$\dfrac{1}{2x^2 - 5x} \cdot 4x - 5$

$y' = \dfrac{4x - 5}{2x^2 - 5x}$

g) $g(x) = (x\ln x)^3$ - FS

$3(x\ln x)^2 \cdot (x \cdot \frac{1}{x}) + (1)\ln x)$

$g'(x) = 3(x\ln x)^2 \cdot (1 + \ln x)$

h) $f(x) = 3^{2x-5}$

$f'(x) = (\ln 3)(3^{2x-5})(2)$

9. Find $\dfrac{dy}{dx}$ for each of the following.

a) $y = x^\pi + e^x + e^5 + \pi^6$

$y' = \pi x^{\pi - 1} + e^x$

b) $y = e^{\pi x} - e^\pi + e^x - x^e$

$y' = e^{\pi x} \cdot \pi + e^x - ex^{e-1}$

c) $y = xe^x + \pi e^\pi$

$y' = xe^x + e^x$

d) $y = e^{6x} - 6^x + 6e^{6x}$

$y' = 6e^{6x} - \ln 6 \cdot 6^x + 36e^{6x}$

10. *Find* $\frac{dy}{dx}$ *for each of the following.*

a) $y = \dfrac{\cos 3x}{\sin 3x}$

$\dfrac{BT' - B'T}{B^2}$

$y' = \dfrac{\sin(3x)(-3\sin(3x)) - (3\cos(3x))(\cos(3x))}{\sin^2(3x)}$

b) $y = \tan(x^3) - (\tan^3(x))$

$y' = \sec^2(x^3)(3x^2) - (3(\tan(x))^2 \cdot (\sec^2(x))$

c) $y = \sqrt{x}\, e^{\sqrt{x}}$

$\underset{F}{x^{1/2}} \cdot \underset{S}{e^{x^{1/2}}}$

$y' = (x^{1/2})(e^{x^{1/2}})(\frac{1}{2}x^{-1/2})$

d) $y = Ax^3 - 2Bx^2 + 3c^4x$

$y' = 3Ax^2 - 4Bx + 3c^4$

e) $y + e^x = 3y^2$

$y' + e^x = 6yy'$

$e^x = 6yy' - y'$

$y'(6y - 1)$

$y' = \dfrac{e^x}{6y-1}$

f) $y = 5x - \dfrac{2}{x^4} + \dfrac{6}{\sqrt{x}} - \dfrac{2}{5\sqrt{x}}$

$2x^{-4}$ $6x^{-1/2}$ $x^{-1/2}$ $\frac{1}{2} \cdot \frac{2}{5}$

$y' = 5 + 8x^{-5} - 3x^{-3/2} + \frac{1}{10}x^{-3/2}$

$y' = 5 + 8x^{-5} - \frac{29}{10}x^{-3/2}$

g) $y = \ln(x^3 - 2x + 7)$

$y' = \dfrac{1}{x^3 - 2x} \cdot 3x^2 - 2$

$y' = \dfrac{3x^2 - 2}{x^3 - 2x}$

h) $y = (x^2 - 3x^5 + 2)^{-3}$

$y' = -3(x^2 - 3x^5 + 2)^{-4}(2x - 15x^4)$

i) $6y - 4x^2 = 3xy$

$6y' - 8x = 3xy' + 3y$

$6y' - 3xy' = \dfrac{8x + 3y}{6 - 3x}$

$y'(6 - 3x)$

j) $y = 6^{x^3}$

$y' = \ln(6) \cdot 6^{x^3} \cdot 3x^2$

k) $y = \sin(xy)$

$y' = \boxed{\cos(xy)}(xy' + y)$

$y' = xy'\square + y\square$

$y' - xy'\square = y\square$

$\dfrac{y'(1 - x\square)}{1 - x\square} = \dfrac{y\square}{1 - x\square}$

$y' = \dfrac{y\cos(xy)}{1 - x\cos(xy)}$

l) $y = \underset{F}{5x}\,\underset{S}{\sin 4x} + (\sin^3 x) - \sin(x^3)$

$y' = (5x)4\cos(4x) + (5)(\sin(4x))(3(\sin(x))^2(\cos(x))$

$\rightarrow -3x^2\cos(x^3)$

Part C:

3. *If* $y=6+2u^2$, $u=4v^2-3v$, $v=-3+2x^2$, *find* $\frac{dy}{dx}$ *at* $x=-1$.

$4+3$ $-3+2$

$u=7$ $V=-1$

$\frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dx}$ $\frac{dy}{dx} =$

$4u \cdot 8v-3 \cdot 4x$

$4(7) \cdot 8(-1)-3 \cdot 4(-1)$

$28 \cdot -11 \cdot -4$

$= \cancel{1056}$

1232

8. Find the general antiderivative of each of the following functions:

DON'T FORGET $+C$

a) $6x^3-2x^2+\frac{5}{x^2}$ x^{-2}

$\frac{3}{2}x^4 - \frac{2}{3}x^3 - 5x^{-1} + c$

b) $3e^{4x}-5e^x$

$\frac{3}{4}e^{4x} - 5e^x + c$

c) $\sin(3x) + 3x$

$-\frac{1}{3}\cos(3x) + \frac{3}{2}x^2 + c$

d) $\int(\cos x)(\sin^3 x)^3 dx$

$u = \sin x$

$du = \cos x\, dx$

$dx = \frac{du}{\cos x}$

$\int \cancel{\cos(x)} \cdot u^3 \cdot \frac{du}{\cancel{\cos(x)}}$

$\frac{1}{4}(\sin x)^4 + C$

e) $x^2\sec^2(x^3)$ $3x^2$

$\frac{1}{3}\tan(x^3) + c$

f) $(3x^2+\cancel{2x})e^{(x^3+x^2)}$ $\frac{1}{3x^2+2x}$

$e^{x^3+x^2} + c$

9. *Find the position function(s) for an object with acceleration function a(t) = t – 2, initial velocity v(0) = 2 and initial position s(0) = 10.*

$v(t) = \frac{1}{2}t^2 - 2t + 2$

$s(t) = \frac{1}{6}t^3 - t^2 + 2t + 10$

10. *Simplify:* $+ c$

a) $\int x^3\, dx$

$\frac{1}{4}x^3 + c$

b) $\int \pi x^2\, dx$

$\frac{1}{3}\pi x^3 + c$

c) $\int \frac{1}{1-x}\, dx$

$-\ln(1-x) + c$

d) $\int e^{4x} - x^2\, dx$

$\frac{1}{4}e^{4x} - \frac{1}{3}x^3 + c$

e) $\int 5y^2\, dx$ don't match

$5y^2x + c$

f) $\int \sin(\pi x)\, dx$

$-\frac{1}{\pi} \cos(\pi x) + c$

*** use u-substitution for g to j**

g) $\int (2x+3)^7\, dx$, $u = 2x+3$

$du = 2\, dx$

$dx = \frac{du}{2}$

$\int u^7$

$\frac{1}{2} \cdot \frac{1}{8}(2x+3)$

$\frac{1}{16}(2x+3) + c$

h) $\int \frac{1}{(3x-2)^8}\, dx$, $u = 3x-2$

$du = 3\, dx$

$dx = \frac{du}{3}$

$\frac{1}{3}\int u^{-8}$

$\frac{1}{3} \cdot \frac{-1}{7}(u)^{-7}$

$\frac{-1}{21}(3x-2)^{-7} + c$

i) $\int x^3\sqrt{2-3x^4}\, dx$

$u = 2-3x^4$

$du = -12x^3\, dx$

$dx = \frac{du}{-12x^3}$

$\int \cancel{x^3}\, u^{1/2} \frac{du}{-12\cancel{x^3}}$

$\frac{-1}{12}\int u^{1/2}\, du$

$\frac{-1}{\cancel{12}_6} \frac{\cancel{2}}{3} u^{3/2} = \frac{-1}{18}(2-3x^4)^{3/2} + c$

j) $\int \frac{3x}{4x^2-3}\, dx$

$u = 4x^2 - 3$

$du = 8x\, dx$

$dx = \frac{du}{8x}$

$\int \frac{3\cancel{x}}{u} \cdot \frac{du}{8\cancel{x}}$

$\frac{3}{8}\int u^{-1}$

$\frac{3}{8}\ln(4x^2-3) + c$

11. *Find the exact value of each of the following:*

a) $\int_{1}^{\sqrt{2}} 3x \; dx$

$\frac{3}{2}x^2 \Big|_1^{\sqrt{2}}$

$\frac{3}{2}(\sqrt{2})^2 - \frac{3}{2}(1)^2$

$3 - \frac{3}{2} = \frac{3}{2}$

b) $\int_{\pi}^{4\pi} 2e^x \; dx$

$2e^x \Big|_{\pi}^{4\pi}$

$2e^{4\pi} - 2e^{\pi}$

c) $\int_{1}^{6} 3m \; dx$

$3mx \Big|_1^6$

$[3m(6)] - [3m(1)] = 15m$

$18m - 3m$

d) $\int_{0}^{\frac{\pi}{2}} 2\cos x \; dx$

$= 2$

e) $\int_{-2}^{1} xe^{x^2} \; dx$

"u-sub"

$\frac{e}{2} - \frac{e^4}{2}$

or

$-\frac{e^4 - e}{2}$

f) $\int_{e}^{4} \frac{\ln x}{x} \; dx$

"u sub"

$\frac{\ln^2(4)}{2} - \frac{1}{2}$

or

$\frac{\ln^2(4) - 1}{2}$

12. *Simplify:*

a) $\int_{a}^{b} 4x^2 \; dx$

$\frac{4}{3}x^3 \Big|_a^b$

$\frac{4}{3}b^3 - \frac{4}{3}a^3$

b) $\int_{\pi}^{3} \frac{5}{x} \; dx$

$5\ln x \Big|_{\pi}^{3}$

$5\ln(3) - 5\ln(\pi)$

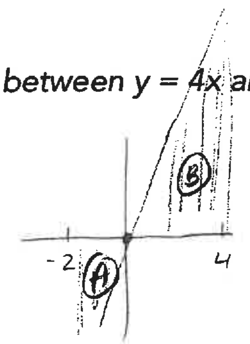
13. Find the exact area between y = 4x and the x-axis over the interval $-2 \le x \le 4$.

A

$\int_{-2}^{0} 4x\,dx$

$2x^2 \Big|_{-2}^{0}$

$[0] - [2(-2)^2]$ $|-8|$
$0 - 8$



A + B

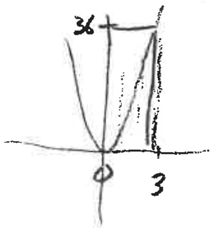
$8 + 32$

$\int_{0}^{4} 4x\,dx$

$2x^2 \Big|_{0}^{4}$

$= 40\,u^2$

14. Find the exact area between $y = 4x^2$ and the y-axis over the interval $0 \le x \le 3$.



36 □ 3 $-$ $\int_{0}^{3} 4x^2\,dx$ $\frac{4}{3}x^3 \Big|^{3}$

$108 - 36$ $= 72\,u^2$

15. Find the exact area between the two curves
$f(x) = x - 3$ and $g(x) = -x^2 - 6$ over the interval $-2 \le x \le 5$.

$\int_{-2}^{5} x - 3 + x^2 + 6\,dx$

$\int_{-2}^{5} x^2 + x + 3\,dx$

$\frac{1}{3}x^3 + \frac{1}{2}x^2 + 3x \Big|_{-2}^{5}$

$\left[\frac{1}{3}(5)^3 + \frac{1}{2}(5)^2 + 3(5)\right] - (-2)$ $= \frac{455}{6}\,u^2$

$\frac{415}{6} + \frac{20}{3}$

16. Find the exact area enclosed by the two curves $f(x) = 6x$ and $g(x) = x^2$.

$\int_{0}^{6} 6x - x^2\,dx$

$6x = x^2$
$x^2 - 6x$
$x(x - 6) = 0$
$0 \quad 6$

$-\frac{1}{3}x^3 + 3x^2 \Big|_{0}^{6}$

$\left[-\frac{1}{3}(6)^3 + 3(6)^2\right] - [0]$ $= 36\,u^2$

$36 - 0$

18. *Simplify:*

a) $\int_a^b 4x\ dx$ $\quad 2x^2 \Big|_a^b$

$2b^2 - 2a^2$

b) $\int_a^2 e^x\ dx$

$e^x \Big|_a^2$

$e^2 - e^a$

c) $\int_{2m}^{5m} y\ dx$

$yx \Big|_{2m}^{5m}$

$5my - 2my$

$= 3my$

d) $\int_{-2a}^{5a} k^2\ dx$ $\quad k^2x \Big|_{-2a}^{5a}$

$5ak^2 + 2ak^2$

$7ak^2$

19. *Solve for x:*

a) $\int_1^x 2m\ dm = 8$

$m^2 \Big|_1^x$

$x^2 - 1 = 8$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

b) $\int_x^5 2t+3\ dt = 40$

$t^2+3t \Big|_x^5$

$[5] - [x]$

$\cancel{40} - [x^2 + 3x] = \cancel{40}$

$-x^2 - 3x = 0$

$-x\ (x+3) = 0$

$x = 0, -3$

Part D:

1. *Evaluate each of the following limits:*

a) $\lim\limits_{x\to -1} 2x^2-5x+3$

$2(-1)^2-5(-1)+3$

$2 \quad +5 \quad +3$

$= 10$

b) $\lim\limits_{x\to e}\left(x^3-2x\right)$

e^3-2e

c) $\lim\limits_{x\to a}\dfrac{(x+a)^2}{\left(x^2+2a^2\right)}$ $\quad \dfrac{(2a)^2}{(a^2+2a^2)} \quad \dfrac{\cancel{4a^2}}{\cancel{3a^2}}$

$= \dfrac{4}{3}$

d) $\lim\limits_{x\to 3}\dfrac{x^2-9}{x-3}$ $\quad \dfrac{0}{0} \quad \lim\limits_{x\to 3}\dfrac{2x}{1} = 6$

e) $\lim\limits_{x\to 2}\dfrac{x-2}{x^3-8}$ $\quad \dfrac{0}{0}$

$\lim\limits_{x\to 2}\dfrac{1}{3x^2} = \dfrac{1}{12}$

f) $\lim\limits_{x\to 0}\dfrac{2\cos x-2}{2x}$ $\quad \dfrac{0}{0} \quad \lim\limits_{x\to 0}\dfrac{-2\sin x}{2} = \dfrac{0}{2}$

$= 0$

g) $\lim\limits_{x\to 0}\dfrac{\cos x-1}{2e^x-2}$ $\quad \dfrac{0}{0} \quad \dfrac{-\sin x}{2e^x} \quad \dfrac{0}{2}$

$= 0$

h) $\lim\limits_{x\to 4}\dfrac{\sqrt{x}-2}{x-4}$ $\quad \dfrac{0}{0} \quad \frac{1}{2}x^{-1/2}$

$\dfrac{1}{2\sqrt{x}} = \dfrac{1}{4}$

2. If $\lim\limits_{x\to 2} f(x)=1$, use the properties of limits to evaluate each limit:

a) $\lim\limits_{x\to 2}\dfrac{x^2-2}{4f(x)}$

$\lim\limits_{x\to 2}\dfrac{x^2-2}{4} = \dfrac{1}{2}$

b) $\lim\limits_{x\to 2}\sqrt{[f(x)]^2+10-x}$

$\lim\limits_{x\to 2}\sqrt{11-x}$

$\sqrt{9}$

$x = 3$

3. *Use the definition of the derivative to find* $\frac{dy}{dx}$:

a) $y = \frac{1}{x+3}$

$$\lim_{h\to 0} \frac{\frac{1}{x+h+3} - \frac{1}{x+3}}{h}$$

$$\lim_{h\to 0} \frac{\cancel{x+3} - \cancel{x} - h - \cancel{3}}{h(x+h+3)(x+3)}$$

$$\lim_{h\to 0} \frac{-\cancel{h}}{\cancel{h}(x+h+3)(x+3)}$$

$$\lim_{h\to 0} \frac{-1}{(x+h+3)(x+3)}$$

$$\frac{dy}{dx} = \frac{-1}{(x+3)^2}$$

b) $y = x^2 - 3x$

$$\lim_{h\to 0} \frac{(x+h)^2 - 3(x+h) - (x^2-3x)}{h}$$

$$\lim_{h\to 0} \frac{\cancel{x^2} + 2xh + h^2 - \cancel{3x} - 3h - \cancel{x^2} + \cancel{3x}}{h}$$

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

$$\lim_{h\to 0} \frac{h(2x+h-3)}{\cancel{h}}$$

$$\lim_{h\to 0} 2x + h - 3$$

$$\frac{dy}{dx} = 2x - 3$$

6. *Evaluate each of the following limits:*

a) $\lim\limits_{x\to\pi} 2x^2+5\pi x-3\pi^2$

$2\pi^2 + 5\pi\cdot\pi - 3\pi^2$

$2\pi^2 + 5\pi^2 - 3\pi^2$

$4\pi^2$

b) $\lim\limits_{x\to 4} \dfrac{x-4}{\sqrt{x}-2} \dfrac{(\sqrt{x}+2)}{(\sqrt{x}+2)}$

$\lim\limits_{x\to 4} \dfrac{\cancel{(x-4)}(\sqrt{x}+2)}{\cancel{(x-4)}}$

$\lim\limits_{x\to 4} \sqrt{x}+2$

$= 4$

c) $\lim\limits_{x\to 0} \dfrac{\sqrt{4+x}-2}{x} \dfrac{(\sqrt{4+x}+2)}{(\sqrt{4+x}+2)}$

$\lim\limits_{x\to 0} \dfrac{4+x-4}{x(\sqrt{4+x}+2)}$

$\lim\limits_{x\to 0} \dfrac{1}{\sqrt{4+x}+2} = \dfrac{1}{4}$

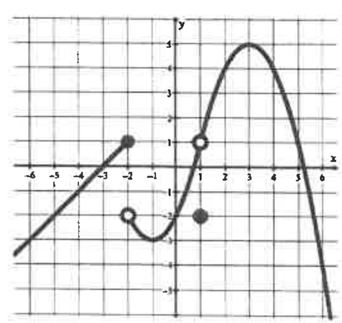
d) $\lim\limits_{x\to 0} \dfrac{e^x-1}{\sin x}$ LH

$\lim\limits_{x\to 0} \dfrac{e^x}{\cos x} = \dfrac{e^0}{\cos(0)} = \dfrac{1}{1}$

$= 1$

7. Give the value of each statement. If the value does not exist, write "does not exist" or "undefined."

a. $\lim\limits_{x\to-2^-} f(x) =$ 1	b. $\lim\limits_{x\to-2^+} f(x) =$ −2	c. $\lim\limits_{x\to-2} f(x) =$ DNE
d. $\lim\limits_{x\to1} f(x) =$ 1	e. $\lim\limits_{x\to0} f(x) =$ −2	f. $\lim\limits_{x\to3^-} f(x) =$ 5
g. $\lim\limits_{x\to-1} f(x) =$ −3	h. $f(1) =$ −2	i. $f(-2) =$ 1



8. Evaluate each limit.

a) $\lim_{x \to 3^-} f(x),\ f(x) = \begin{cases} -x+4, & x<3 \\ \frac{x}{2}+1, & x \geq 3 \end{cases}$

b) $\lim_{x \to -2^-} f(x),\ f(x) = \begin{cases} -x^2-8x-17, & x \leq -2 \\ 2x-1, & x > -2 \end{cases}$

$\lim_{x \to 3^-} -x+4 = 1$

$\lim_{x \to -2^-} -x^2-8x-17$

$-(-2)^2-8(-2)-17$

$-4+16-17 = -5$