Name: ______________________________

Math 10550, Final Exam:
December 17, 2008

Instructor: __________________________

- The Honor Code is in effect for this examination, including keeping your answer sheet under cover.
- No calculators are to be used.
- The exam lasts for two hours.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 14 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(e)	15.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)	16.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)	17.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)	18.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)	19.	(a)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(d)	(e)	20.	(a)	(b)	(c)	(d)	(e)
7.	(a)	(b)	(c)	(d)	(e)	21.	(a)	(b)	(c)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(e)	22.	(a)	(b)	(c)	(d)	(e)
9.	(a)	(b)	(c)	(d)	(e)	23.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)	24.	(a)	(b)	(c)	(d)	(e)
11.	(a)	(b)	(c)	(d)	(e)	25.	(a)	(b)	(c)	(d)	(e)
12.	(a)	(b)	(c)	(d)	(e)						
13.	(a)	(b)	(c)	(d)	(e)						
14.	(a)	(b)	(c)	(d)	(e)						

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Multiple Choice

1.(6 pts.) Find the limit

$$\lim_{x\to 0} \frac{3-\sqrt{x+9}}{x}.$$

(a) $-\frac{1}{6}$

(b) -3

(c) The limit does not exist.

(d) $\frac{1}{6}$

(e) 3

$$\frac{3-\sqrt{x+9}}{x} = \frac{3^2-(\sqrt{x+9})^2}{x(3+\sqrt{x+9})} = \frac{9-x-9}{x(3+\sqrt{x+9})} = \frac{-\cancel{x}}{\cancel{x}(3+\sqrt{x+9})} = \frac{-1}{3+\sqrt{x+9}}$$

$$\lim_{x\to 0} \frac{3-\sqrt{x+9}}{x} = \lim_{x\to 0} \frac{-1}{3+\sqrt{x+9}} = \frac{-1}{3+\sqrt{9}} = \frac{-1}{3+3} = -\frac{1}{6}$$

2.(6 pts.) Find all points where the following function is discontinuous

↳ "or not defined."

$$f(x) = \begin{cases} \frac{(x-1)(x+2)}{(x^2-1)x} & x \neq 1 \\ \frac{3}{2} & x = 1 \end{cases}.$$

(a) $x=-2, x=-1, x=1$

(b) $x=0, x=-1$

(c) $x=0, x=1$

(d) $x=0, x=-2, x=1$

(e) $x=0, x=-1, x=1$

$x \neq 1$:

$$\frac{(x-1)(x+2)}{(x^2-1)(x)} = \frac{(x-1)(x+2)}{(x-1)(x+1)\,x} \leftarrow \text{not defined for } x=0 \text{ or } x=-1$$

$x=1$:

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

↑ $x \neq 1$

↑ Hence, cts. @ $x=1$.

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3.(6 pts.) If

$$f(x) = \sqrt{1+\sqrt{1+x}}, \quad = \left(1 + (1+x)^{1/2}\right)^{1/2}$$

then $f'(8) =$

(a) $\frac{1}{8}$ (b) $\frac{1}{9}$ (c) $\frac{1}{24}$ (d) $\frac{1}{2}$ (e) $\frac{1}{12}$

$$f'(x) = \frac{1}{2}\left(1 + (1+x)^{1/2}\right)^{-1/2} \cdot \left(\frac{1}{2}(1+x)^{-1/2}(1)\right)$$

$$f'(8) = \frac{1}{2}\left(1 + \sqrt{9}\right)^{-1/2} \cdot \left(\frac{1}{2}\ \frac{1}{\sqrt{9}}\right) = \frac{1}{2} \cdot \frac{1}{\sqrt{4}} \cdot \frac{1}{2} \cdot \frac{1}{3} = \frac{1}{24}$$

4.(6 pts.) The second derivative of

$$f(x) = \frac{\sin x}{x}$$

is

(a) $\dfrac{-x^2 \sin x + 4x\cos x + 5\sin x}{x^3}$

(b) $\dfrac{-x^2 \sin x - 3x\cos x + 2\sin x}{x^3}$

(c) $\dfrac{x^2 \sin x + 4x\cos x + 2\sin x}{x^3}$

(d) $\dfrac{-x^2 \sin x - 2x\cos x + 2\sin x}{x^3}$

(e) $\dfrac{-x^2 \sin x - 3x\cos x + 3\sin x}{x^3}$

$$f'(x) = \frac{x\cos(x) - \sin(x)}{x^2}$$

$$u = x\cos(x) - \sin(x)$$

$$\frac{du}{dx} = \cos(x) - x\sin(x) - \cos(x)$$

$$= -x\sin(x)$$

$$v = x^2 \Rightarrow \frac{dv}{dx} = 2x$$

$$\Rightarrow f''(x) = \frac{x^{\cancel{2}}\left(-x\sin(x)\right) - \left(x\cos(x) - \sin(x)\right)2\cancel{x}}{x^{\cancel{4}\,3}}$$

$$= \frac{-x^2\sin(x) - 2x\cos(x) + 2\sin(x)}{x^3}$$

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5.(6 pts.) A body travels along a straight line according to the law

$$s = -t^4 - 4t^3 + 20t^2, \quad t \geq 0.$$

At what position, **after** the motion gets started, does the body first come to rest?

(a) $s = 36$ (b) $s = 24$ (c) $s = 2$

(d) $s = 32$ (e) $s = 12$

$v(t) = s'(t) = -4t^3 - 12t^2 + 40t = -t(4t^2 + 12t - 40)$

$\underline{v(t) = 0:}$ Sol $\underline{1}$ 1 : $t = 0$

$\underline{\text{OR:}}$ $4t^2 + 12t - 40 = 0 \iff t^2 + 3t - 10 = 0 \iff (t+5)(t-2) = 0$

$\iff \underline{t = 2}$ ✓ or $\underline{t = -5}$ ← unphysical

$s(2) = -16 - 4(8) + 20(4)$

$= -16 - 32 + 80$

$= 32$

6.(6 pts.) Find an equation for the tangent line to

$$f(x) = \tan(x^2 + 2x)$$

at the point $(0, 0)$.

(a) $y = 2x$ (b) $y = 0$ (c) $y = \sqrt{2}x$

(d) $y = 2\sqrt{2}x$ (e) $y = -2x$

$f'(x) = \sec^2(x^2 + 2x) \cdot (2x + 2)$

$f'(0) = \sec^2(0)(2(0) + 2) = (1)(2) = 2$

$h:$ $y - f(0) = f'(0)(x - 0)$

$y - 0 = 2x$

$y = 2x$

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7.(6 pts.) Find an equation for the tangent line to the curve

$$x^3 + y^3 = 4xy$$

at the point $(2, 2)$.

(a) $y = 2x - 2$ (b) $y = x$ (c) $y = -x + 4$

(d) $y = -x - 4$ (e) $y = -2x + 6$

$$3x^2 + 3y^2y' = 4y + 4xy'$$

$(2,2)$ $\to$ $3(4) + 3(4)y' = 4(2) + 4(2)y'$

$\Rightarrow$ $12 + 12y' = 8 + 8y'$ $\Rightarrow$ $4y' = -4$

$\Rightarrow$ $y' = -1$

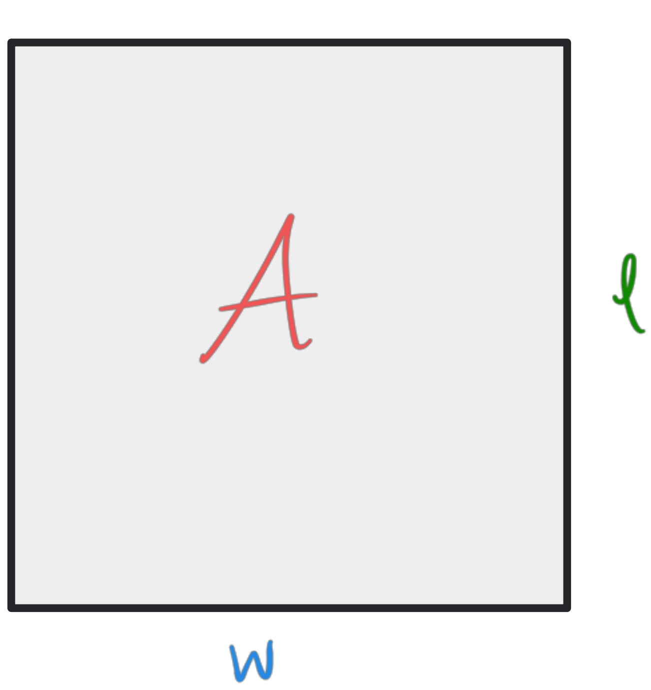
$y - 2 = (-1)(x-2)$

$y = -x + 4$

8.(6 pts.) The length of a rectangle is increasing at a rate of 8 cm/sec and its width is increasing at a rate of 3 cm/sec. When the length is 20 cm and the width is 10 cm, how fast is the area of the rectangle increasing?

(a) $140\,\mathrm{cm}^2/\mathrm{sec.}$ (b) $211\,\mathrm{cm}^2/\mathrm{sec.}$ (c) $190\,\mathrm{cm}^2/\mathrm{sec.}$

(d) $11\,\mathrm{cm}^2/\mathrm{sec.}$ (e) $24\,\mathrm{cm}^2/\mathrm{sec.}$



$\dot{\ell} = 8\,\mathrm{cm/s}$

$\dot{w} = 3\,\mathrm{cm/s}$

$A(t) = \ell(t)w(t)$

$\dot{A}(t) = \dot{\ell}(t)w(t) + \ell(t)\dot{w}(t)$

$t = t_*$ $\to$

$\dot{A}(t_*) = 8w(t_*) + 3\ell(t_*)$

$= 8(10) + 3(20) = 140\,\mathrm{cm}^2/\mathrm{s}$

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9.(6 pts.) Use linear approximation to estimate

$$\frac{1}{\sqrt{3.9}}.$$

(a) $\frac{1}{\sqrt{3.9}} \approx \frac{9}{20}$ (b) $\frac{1}{\sqrt{3.9}} \approx \frac{1}{2}$ (c) $\frac{1}{\sqrt{3.9}} \approx \frac{81}{160}$

(d) $\frac{1}{\sqrt{3.9}} \approx \frac{11}{20}$ (e) $\frac{1}{\sqrt{3.9}} \approx \frac{79}{160}$

$f(x) = \frac{1}{\sqrt{x}} = x^{-1/2}$

$f'(x) = -\frac{1}{2} x^{-3/2} = \frac{-1}{2\, x^{3/2}}$

$f(4) = \frac{1}{2}$

$f'(4) = \frac{-1}{16}$

$L_4(x) = \frac{-1}{16}(x-4) + \frac{1}{2}$

$f(3.9) \approx L_4(3.9)$

$= -\frac{1}{16}(3.9-4) + \frac{1}{2}$

$= -\frac{1}{16}\left(-\frac{1}{10}\right) + \frac{1}{2}$

$= \frac{81}{160}$

10.(6 pts.) Let

$$f(x) = x^3 + 3x^2 - 24x.$$

Find the absolute maximum and absolute minimum values of f on the interval $[0, 10]$.

(a) Max at $x = 4$; Min at $x = 0$. (b) Max at $x = 10$; Min at $x = 0$.

(c) Max at $x = 4$; Min at $x = 2$. (d) Max at $x = 10$; Min at $x = 2$.

(e) Max at $x = 4$; Min at $x = 1$.

crit. pt's @ $x = -4$, $x = 2$

$f'(x) = 3x^2 + 6x - 24 = 3(x^2 + 2x - 8) = 3(x+4)(x-2)$

$f(0) = 0$

$f(2) = 8 + 12 - 48 = -28$ ← abs. min.

$f(4) = 64 + 48 - 72 = 50$

$f(10) = 1000 + 300 - 240 = 1060$ ← abs. Max

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11. (6 pts.) Find the local and absolute maximum and minimum of

$$f(x) = 3x^{2/3} - x.$$

(a) Local min at $x = 1/8$; absolute min at $x = 1$; no absolute max.

(b) Local min at $x = 1$; local max at $x = 1/8$; no absolute min; absolute max at $x = -27$.

(c) Absolute min at $x = 0$; absolute max at $x = 8$.

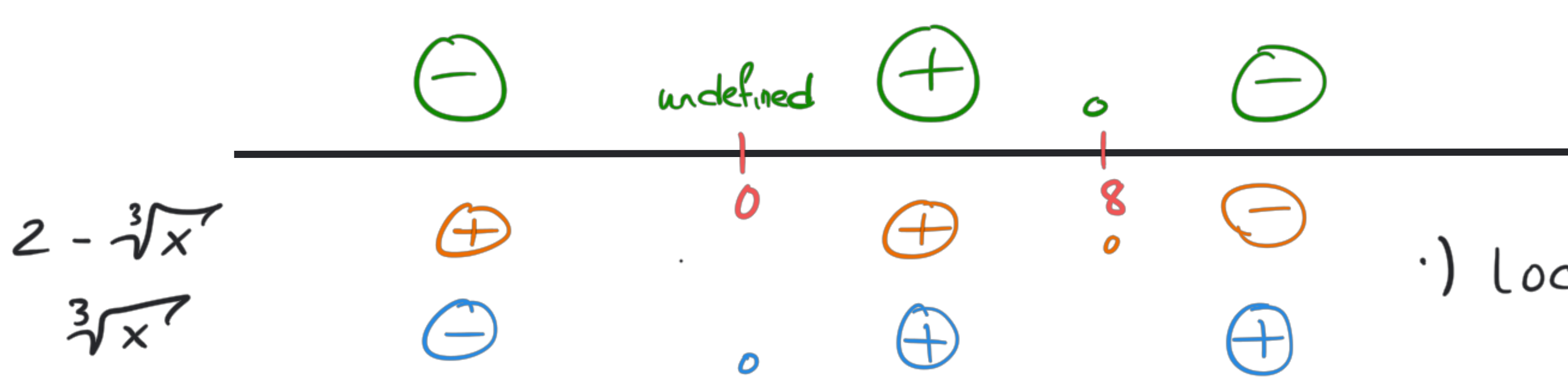
(d) Local min at $x = 0$; local max at $x = 8$; no absolute max or min.

(e) Local max at $x = 1$; no absolute max; absolute min at $x = 0$.

$$f'(x) = 2x^{-1/3} - 1 = \frac{2}{\sqrt[3]{x}} - 1 = \frac{2 - \sqrt[3]{x}}{\sqrt[3]{x}}$$

$=0$ for $x = 8$

not defined for $x = 0$



$\Rightarrow$ local min @ $x=0$

•) local max @ $x=8$.

•) $\lim_{x \to -\infty} f(x) = \infty$

$\Rightarrow$ no absolute max.

•) no absolute min:

$\lim_{x \to \infty} f(x) = -\infty$

12. (6 pts.) Let

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

On what intervals is f concave up?

(a) $(-1, 0) \cup (0, \infty)$ (b) $(-8, 8)$ (c) $(1, \infty)$

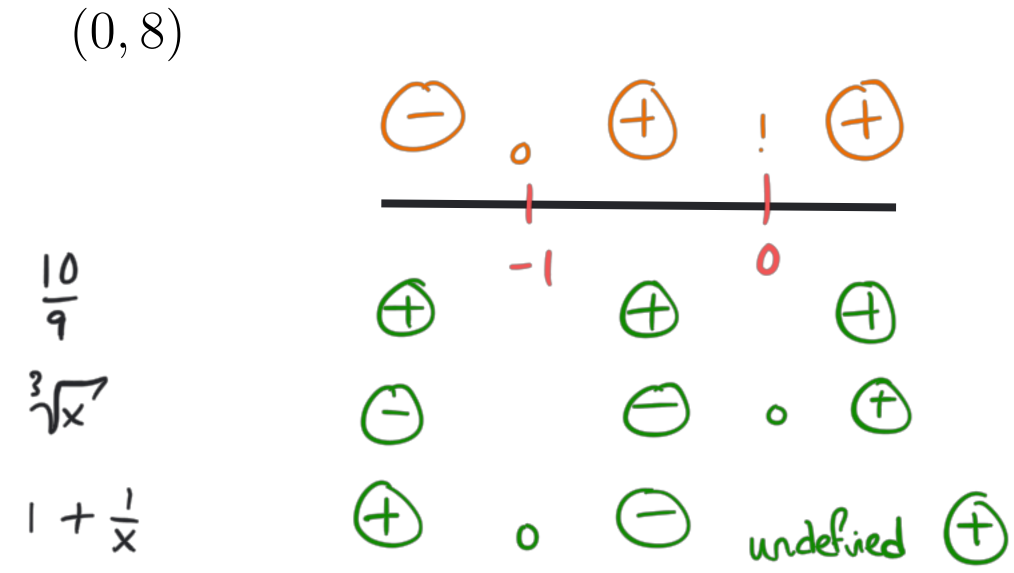
(d) $(-\infty, -1)$ (e) $(0, 8)$

$$f'(x) = \frac{5}{3}x^{\frac{2}{3}} - \frac{10}{3}x^{-1/3}$$

$$f''(x) = \frac{10}{9}x^{-1/3} + \frac{10}{9}x^{-4/3}$$

$$= \frac{10}{9}x^{-1/3}\left(1 + x^{-1}\right)$$

$$= \frac{10}{9} \cdot \frac{1}{\sqrt[3]{x}}\left(1 + \frac{1}{x}\right)$$



Concave up: $(-1, 0) \cup (0, \infty)$

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13.(6 pts.) Evaluate the limit

$$\lim_{x\to\infty} \left(\sqrt{x^2+2x} - x\right).$$

(a) $-\infty$ (b) 0 (c) 1 (d) 2 (e) ∞

$$\sqrt{x^2+2x} - x = \frac{x^2+2x-x^2}{\sqrt{x^2+2x}+x} = \frac{2x}{\sqrt{x^2+2x}+x} \overset{\text{for } x>0}{=} \frac{2}{\sqrt{1+\frac{2}{x}}+1}$$

$$\Rightarrow \lim_{x\to\infty}\left(\sqrt{x^2+2x}-x\right) = \frac{2}{\sqrt{1}+1} = 1$$

14.(6 pts.) The equation of the slant asymptote of the curve $y = \dfrac{2x^2+1}{x+1}$ is:

(a) $y = 2x$ (b) $y = 2x - 2$ (c) $y = -2x + 2$

(d) $y = x + 2$ (e) $y = 2x + 2$

$$2x - 2 + \frac{3}{x+1}$$

$$\begin{array}{r|l} x+1 & 2x^2+1 \\ & -2x^2 \mp 2x \\ \hline & -2x+1 \\ & \pm 2x \pm 2 \\ \hline & 3 \end{array}$$

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15.(6 pts.) Suppose the line $y = 4x - 2$ is tangent to the curve $y = f(x)$, when $x = 1$. If the Newton's method is used to locate a root of the equation $f(x) = 0$ and the initial approximation is $x_1 = 1$, find the second approximation x_2

(a) -4 (b) 1 (c) 0 (d) 2 (e) $1/2$

Tangent line to $y=f(x)$ when $x=1$: $y - f(1) = f'(1)(x-1)$

$\Rightarrow \quad y = f'(1)(x-1) + f(1) = f'(1)x - f'(1) + f(1)$

$y = 4x - 2$

$\Rightarrow \quad f'(1) = 4$ and $-f'(1) + f(1) = -2$

$\Rightarrow \quad -4 + f(1) = -2 \Rightarrow f(1) = 2$

$\Rightarrow \quad x_2 = 1 - \dfrac{f(1)}{f'(1)} = 1 - \dfrac{2}{4} = \dfrac{1}{2}$

16.(6 pts.) Calculate the following definite integral

$$\int_1^5 (5-x)^2 dx =$$

(a) 16 (b) $-\frac{64}{3}$ (c) 3 (d) -16 (e) $\frac{64}{3}$

$$\int_1^5 (5-x)^2 dx = \int_4^0 u^2(-du) = \int_0^4 u^2 du = \frac{u^3}{3}\Big|_0^4 = \frac{64}{3}$$

$u = 5 - x$

$du = -dx$

$x = 1 \Rightarrow u = 4$

$x = 5 \Rightarrow u = 0$

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17.(6 pts.) Let $g(x) = \int_{\sin x}^{0} t^2\, dt$. Find $g'(x)$.

(a) $-(\cos x)^2 \cos x$ (b) $-(\sin x)^2 \cos x$

(c) $(\cos x)^2 \cos x$ (d) $-(\sin x)^2 \sin x$

(e) $(\sin x)^2 \cos x$

$$g'(x) = -(\sin(x))^2 \cdot (\cos(x))$$

$$\frac{d}{dx}\left\{ \int_{g(x)}^{a} f(t)\, dt \right\} = -f(g(x)) \cdot g'(x)$$

18.(6 pts.) Calculate the integral $\int_0^2 \frac{x}{\sqrt{x^2+1}}\, dx$

(a) $\sqrt{5}-1$ (b) $-\sqrt{5}-1$ (c) $1-\sqrt{5}$

(d) $\sqrt{5}$ (e) 4

$u = x^2+1$

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

$\frac{1}{2}du = x\,dx$

$x = 0 \Rightarrow u = 1$

$x = 2 \Rightarrow u = 5$

$$\int_0^2 \frac{x}{\sqrt{x^2+1}}\, dx = \int_1^5 \frac{1}{\sqrt{u}}\left(\frac{1}{2}\right) du$$

$$= \frac{1}{2}\int_1^5 u^{-1/2}\, du$$

$$= \cancel{\frac{1}{2}}\, \frac{u^{1/2}}{\cancel{1/2}}\Bigg|_1^5$$

$$= \sqrt{5} - 1$$

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19.(6 pts.) Which of the following is a Riemann sum corresponding to the integral

$$\int_0^1 \big(\tan x + 2\big)dx.$$

$\Delta x = 1/n$

(a) $2 + \frac{1}{n}\sum_{i=1}^{n} \tan(\frac{i}{n})$

(b) $\frac{2}{n} + \frac{2}{n}\sum_{i=1}^{n} \tan(\frac{i}{n})$

(c) $\frac{1}{n}\sum_{i=1}^{n} \Big(\tan(\frac{i}{n}) + 2\Big)$

(d) $\frac{2}{n}\sum_{i=1}^{n} \tan(\frac{2i}{n})$

(e) $\frac{1}{2n}\sum_{i=1}^{n} \tan(\frac{2i}{n})$

$$R_n = \sum_{i=1}^{n} \frac{1}{n} f\left(\frac{i}{n}\right)$$

$$= \sum_{i=1}^{n} \frac{1}{n}\left(\tan\left(\frac{i}{n}\right) + 2\right) \quad c$$

$$= \sum_{i=1}^{n} \frac{1}{n}\tan\left(\frac{i}{n}\right) + \sum_{i=1}^{n} \frac{2}{n}$$

$$= \sum_{i=1}^{n} \frac{1}{n}\tan\left(\frac{i}{n}\right) + 2 \quad a$$

20.(6 pts.) The point on the line $6x + y = 9$ that is closest to the origin has x-coordinate

(a) $x = \frac{3}{2}$ (b) $x = 0$ (c) $x = 1$

(d) $x = \frac{44}{9}$ (e) $x = \frac{54}{37}$

$d =$ distance to origin $= \sqrt{x^2+y^2} \Rightarrow D = d^2 = x^2 + y^2$

$\Rightarrow D = x^2 + (9-6x)^2 = 37x^2 - 108x + 81$

$D'(x) = 74x - 108 \Rightarrow$ critical pt @ $x = \frac{54}{37}$

$D''(x) = 74 > 0 \Rightarrow$ min.

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21.(6 pts.) The curves $y = x^4 - 3$ and $y = -x^4 + 5$ enclose an area. Set up a definite integral which calculates the area of this region.

(a) $\displaystyle\int_{-1}^{1} (8 - 2x^4)\, dx$

(b) $\displaystyle\int_{0}^{\sqrt{3}} (8 - 2x^4)\, dx$

(c) $\displaystyle\int_{-1}^{1} 2\, dx$

(d) $\displaystyle\int_{-\sqrt{2}}^{\sqrt{2}} 2\, dx$

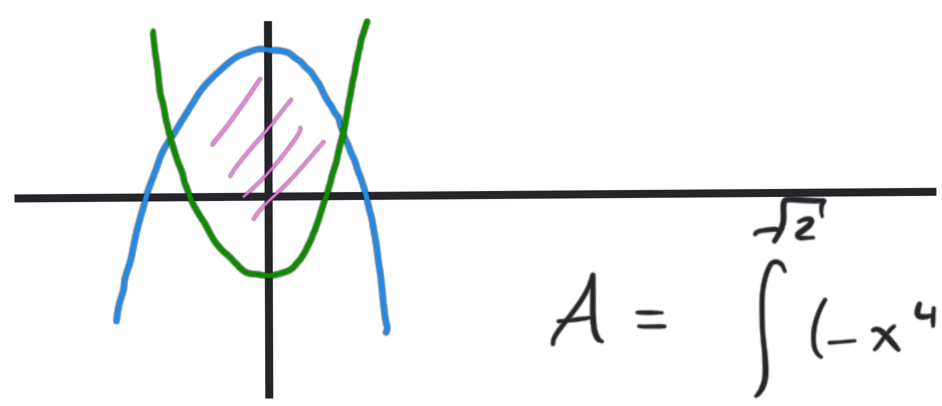
(e) $\displaystyle\int_{-\sqrt{2}}^{\sqrt{2}} (8 - 2x^4)\, dx$

$x^4 - 3 = -x^4 + 5$

$\Rightarrow 2x^4 = 8$

$\Rightarrow x^4 = 4$

$\Rightarrow x = \pm\sqrt{2}$



$$A = \int_{-\sqrt{2}}^{\sqrt{2}} (-x^4 + 5) - (x^4 - 3)\, dx$$

$$= \int_{-\sqrt{2}}^{\sqrt{2}} -2x^4 + 8\, dx$$

22.(6 pts.) The plane region bounded below by the graph of $y = x$ and above by the graph $y = \sqrt{x}$ is rotated about the line $x = 5$. Which integral below gives the volume?

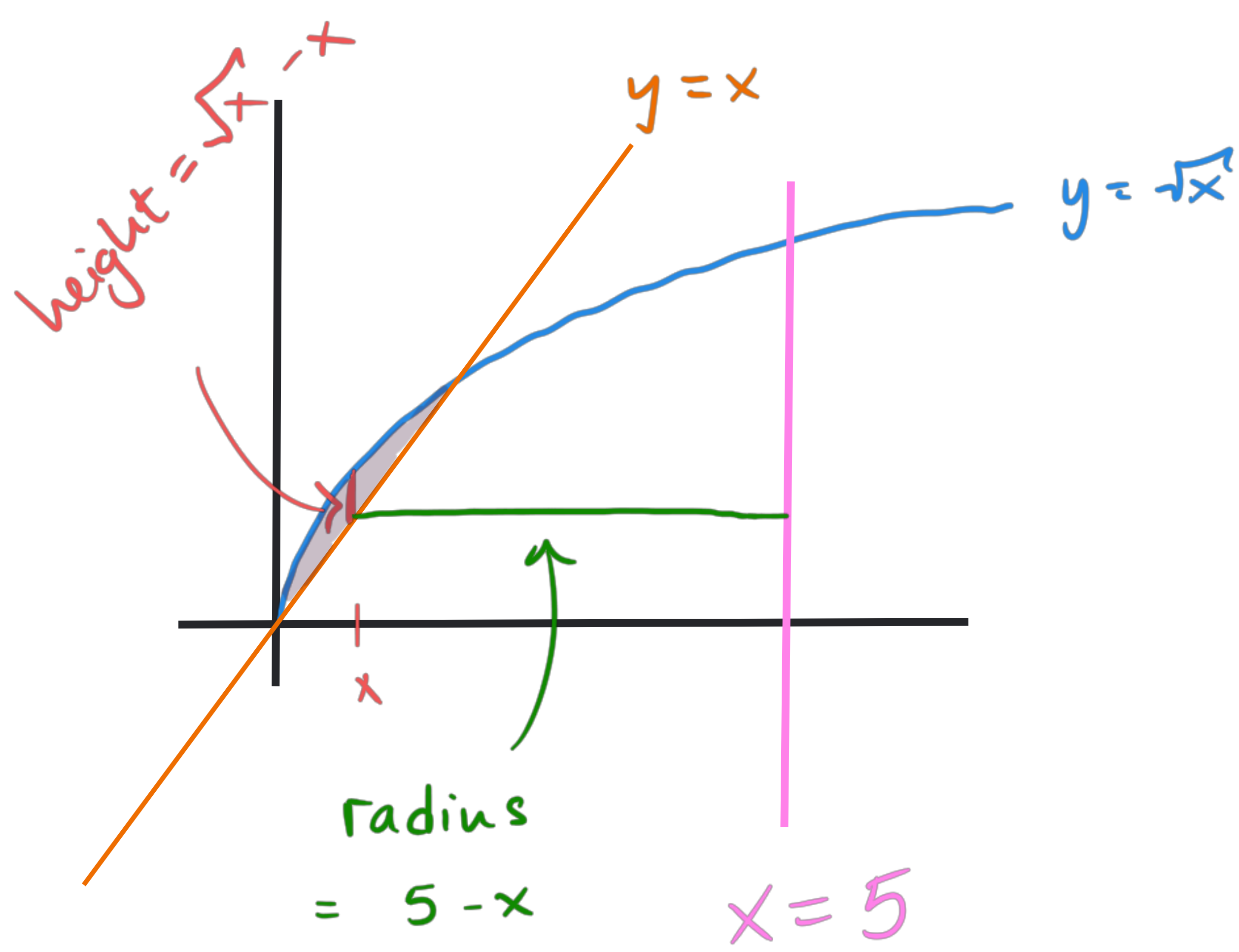
(a) $\displaystyle\pi \int_{0}^{1} (5 - \sqrt{x})^2 - (5 - x)^2 dx$

(b) $\displaystyle\pi \int_{0}^{1} (5 - x)^2 - (5 - \sqrt{x})^2 dx$

(c) $\displaystyle 2\pi \int_{0}^{1} (x - 5) \cdot (\sqrt{x} - x) dx$

(d) $\displaystyle 2\pi \int_{0}^{1} (5 - x) \cdot (x - \sqrt{x}) dx$

(e) $\displaystyle 2\pi \int_{0}^{1} (5 - x) \cdot (\sqrt{x} - x) dx$



$$V = 2\pi \int_0^1 (\sqrt{x} - x)(5 - x)\, dx$$

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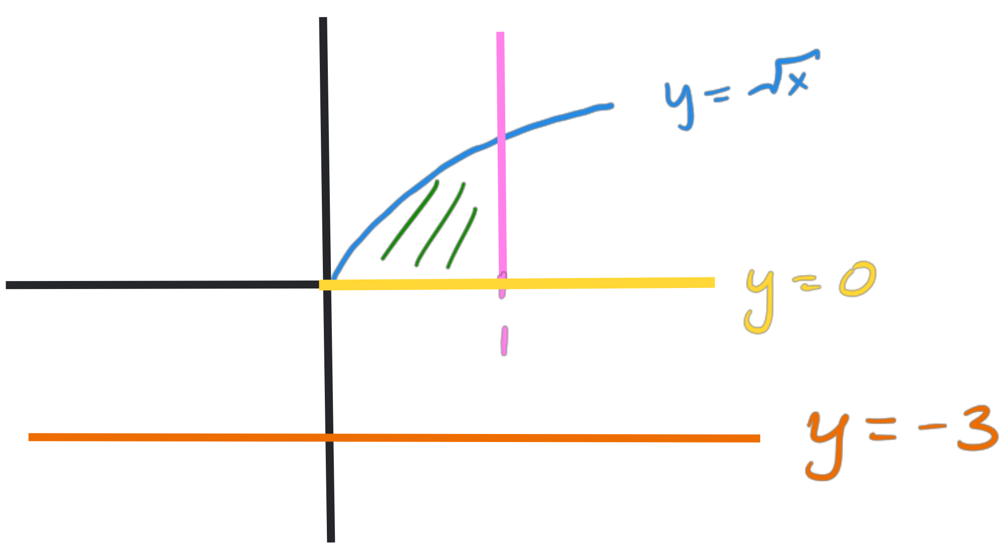
23.(6 pts.) Consider the plane region bounded by the graphs of $y = \sqrt{x}$, $y = 0$ and $x = 1$. Rotate this region about the line $y = -3$ and calculate the volume.

(a) $\frac{3\pi}{3}$ (b) $\frac{9\pi}{2}$ (c) $\frac{7\pi}{2}$ (d) $\frac{15\pi}{2}$ (e) $\frac{27\pi}{2}$



$$V = \int_0^1 \pi(\sqrt{x}+3)^2\,dx - \int_0^1 \pi(3)^2\,dx$$

$$= \pi \int_0^1 x + 6\sqrt{x}\,dx$$

$$= \pi\left(\frac{x^2}{2} + 4x^{3/2}\right)\Big|_0^1 = \pi\left(\frac{1}{2}+4\right) = \frac{9\pi}{2}$$

24.(6 pts.) Find the average of $f(x) = \sin^2(x) \cdot \cos(x)$ over $[0, \frac{\pi}{2}]$.

(a) $\frac{2}{3\pi}$ (b) $\frac{2}{\pi}$ (c) $\frac{1}{3}$

(d) $\frac{1}{\pi}$ (e) $\frac{1}{3\pi}$

$$\frac{2}{\pi}\int_0^{\pi/2} \sin^2(x)\cos(x)\,dx = \frac{2}{\pi}\int_0^1 u^2\,du = \frac{2}{\pi}\frac{u^3}{3}\Big|_0^1$$

$u = \sin(x)$

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

$du = \cos(x)\,dx$

$x = 0 \Rightarrow u = 0$

$x = \frac{\pi}{2} \Rightarrow u = 1$

$$= \frac{2}{\pi}\,\frac{1}{3} = \frac{2}{3\pi}$$

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25.(6 pts.) A (vertical) cylindrical tank has a height 1 meter and base radius 1 meter. It is filled full with a liquid with a density 100 kg/m^3. Find the work required to empty the tank by pumping all of the liquid to the top of the tank.

(a) 0 kg-m

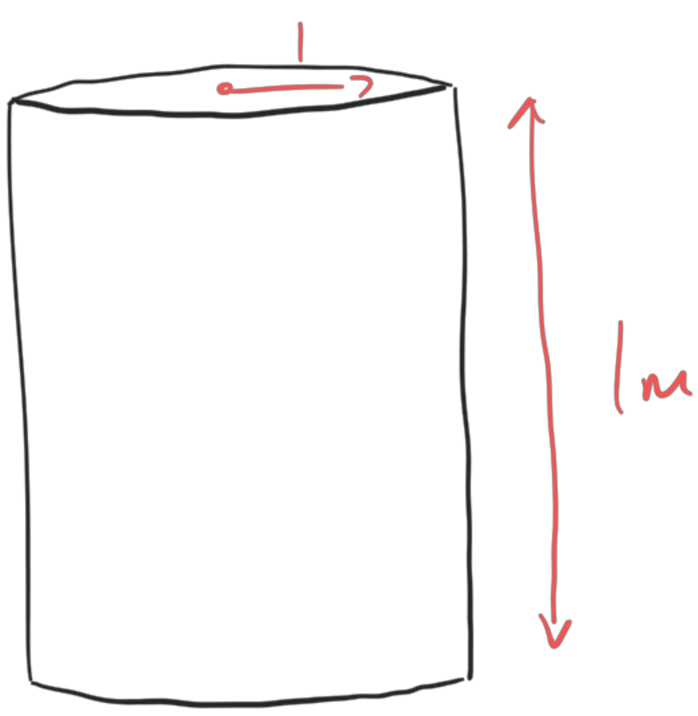
(b) 200π kg-m

(c) 50π kg-m

(d) 500π kg-m

(e) 100π kg-m

Wrong units?
Missing g?



Method 1: Force needed after x meters are gone

= weight left after x meters are gone

$$= \underbrace{\pi(1)^2(1-x)}_{\text{Volume}}\ \underbrace{(100)}_{\text{density}}\ \underbrace{g}_{\text{gravity}} = 100\pi g(1-x)$$

$$W = \int_0^1 100\pi g(1-x)\,dx = 100\pi g\left(x - \frac{x^2}{2}\right)\Big|_0^1 = 50\pi g$$

Name: ____________________

Math 10550, Final Exam:
December 17, 2008

Instructor: ANSWERS

- The Honor Code is in effect for this examination, including keeping your answer sheet under cover.
- No calculators are to be used.
- The exam lasts for two hours.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 14 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(•)	(b)	(c)	(d)	(e)	15.	(a)	(b)	(c)	(d)	(•)
2.	(a)	(•)	(c)	(d)	(e)	16.	(a)	(b)	(c)	(d)	(•)
3.	(a)	(b)	(•)	(d)	(e)	17.	(a)	(•)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(•)	(e)	18.	(•)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(•)	(e)	19.	(a)	(b)	(•)	(d)	(e)
6.	(•)	(b)	(c)	(d)	(e)	20.	(a)	(b)	(c)	(d)	(•)
7.	(a)	(b)	(•)	(d)	(e)	21.	(a)	(b)	(c)	(d)	(•)
8.	(•)	(b)	(c)	(d)	(e)	22.	(a)	(b)	(c)	(d)	(•)
9.	(a)	(b)	(•)	(d)	(e)	23.	(a)	(•)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(•)	(e)	24.	(•)	(b)	(c)	(d)	(e)
11.	(a)	(b)	(c)	(•)	(e)	25.	(a)	(b)	(•)	(d)	(e)
12.	(•)	(b)	(c)	(d)	(e)						
13.	(a)	(b)	(•)	(d)	(e)						
14.	(a)	(•)	(c)	(d)	(e)						