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Exam I: MTH 111, Spring 2016

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QUESTION 1. $(e^{pi}+1)$/2.81 . Let $f(x) = 3e^{(2x-4)}$. Then $f'(2) =$

~~(a)~~ 6 (b) 3 (c) 0 (d) 5

$(e^{pi}+2)$/2.82 . Let $f(x) = ln\left((3x-4)^5\right)$. Then $f'(3) =$

(a) 5 (b) 15 (c) 1 ~~(d)~~ 3

$(e^{pi}+3)$/2.83 . The graph of $f'(x)$ is below

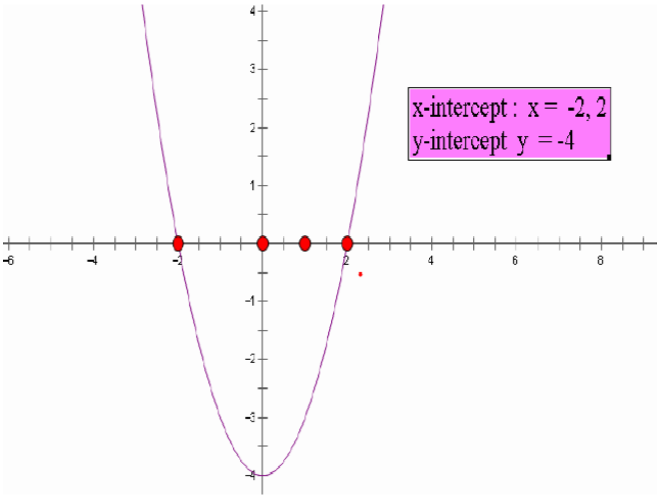

Figure 1. This the graph of $f'(x)$.

The valus of x where $f(x)$ is decreasing:

(a) $-\infty < x < -2$ ~~(b)~~ $-2 < x < 2$ (c) $-2 < x < 0$ (d) $-\infty < x < 0$

$(e^{pi}+4)$/2.84 . Let $f'(x)$ as above. Then $f(x)$ has a minimum value when $x =$

(a) $x = -2$ (b) $x = 0$ (c) $x = -4$ ~~(d)~~ $x = 2$

$(e^{pi}+5)$/2.85 . We want to construct a rectangle between $f(x) = 4 - x^2$ and $g(x) = -5$ (see picture). The maximum area of the rectangle is

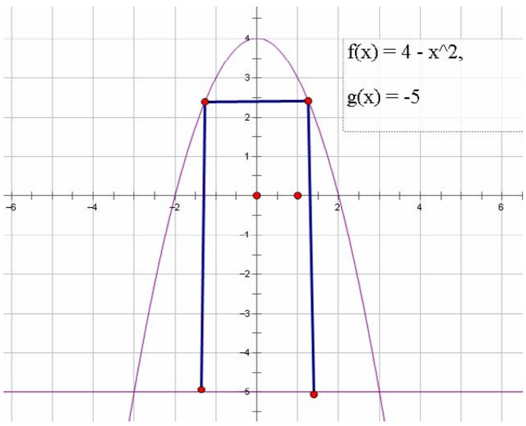

Figure 2. Rectangle between $y = 4 - x^2$ and $y = -5$.

(a) $6\sqrt{3}$ (b) 6 (c) $2\sqrt{3}$ ~~(d)~~ $12\sqrt{3}$

$(e^{pi}+6)/2.86$. Let $f(x) = -2x^3 + 12x^2 + 10$. Then $f(x)$ has a maximum value when

(a) $x = -2$ (b) $x = 4$ (c) $x = 6$ ~~(d)~~ $x = 2$

$(e^{pi}+7)/2.87$. Let $f(x) = -2x^3 + 12x^2 + 10$. Then $f(x)$ has a maximum value when

(a) $x = -2$ (b) $x = 4$ (c) $x = 6$ (d) $x = 2$

$(e^{pi}+8)/2.88$. Let $f(x) = xe^{-x}$. Then $f(x)$ is increasing when

(a) $x > 0$ (b) $x < 0$ (c) $x > 1$ ~~(d)~~ $x < 1$

$(e^{pi}+9)/2.89$. Let $f(x) = \sqrt{12x-3}$. Then $f'(1)$ =

(a) 4 (b) $\frac{4}{3}$ ~~(c)~~ 2 (d) $\frac{6}{\sqrt{3}}$

$e^{pi}+10)/2.810$. You are asked to construct a fence around a rectangular piece of land on the beach (so the fence will surround three sides since one side will be open to the sea, see picture). Given that the length of the fence = 100 m (hence parameter of the rectangular land is 100m). The maximum area of land that can be enclosed by the fence is

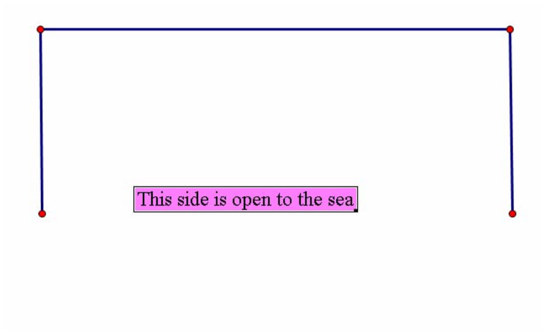

Figure 3. Rectangular region that is open from one side and with parameter (fence) = 100 m.

(a) $625m^2$ (b) $750m^2$ ~~(c)~~ $1250m^2$ (d) $1875m^2$

$e^{pi}+11)/2.811$. We want to construct a rectangle between $y = e^{-x}$ and $y = -e^{-x}$(see picture, one side will be on the y-axis). The maximum area of the rectangle is

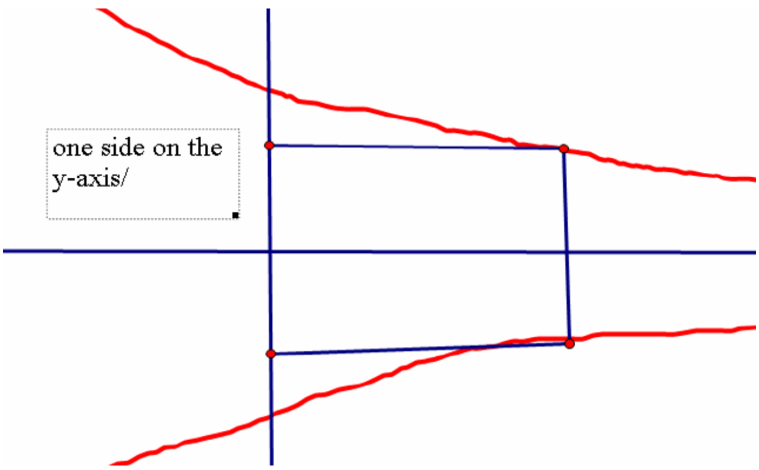

Figure 4. Rectangle between $y = e^{-x}$ and $y = -e^{-x}$.

(a) $\frac{4}{e}$ (b) $\frac{1}{e}$ ~~(c)~~ $\frac{2}{e}$ (d) $\frac{7}{e}$

$e^{pi}+12)/2.812$. Let $f(x) = (3x^2 - 10)^3$. Then the slope of the tangent line to the curve of $f(x)$ when $x = 2$ is

(a) 12 (b) 36 (c) 24 ~~(d)~~ 144

$e^{pi}+13)/2.813$. Let $f(x) = 2e^{(2x-2)} + 5$. Then the equation of the tangent line to the curve of $f(x)$ when $x = 2$ is

~~(a)~~ y = 4x + 3 (b) y = 2x + 5 (c) y = x + 6 (d) y = 4x

$(e^{pi}+14)$/2.814 . Let $f(x) = ln\left(\frac{e^{2x}}{x+1}\right)$ + 4. The equation of the tangent line to the curve of $f(x)$ when $x = 0$ is

~~(a)~~ y = x + 4 (b) y = 2x + 2 (c) y = x (d) y = 3x + 4

$(e^{pi}+15)$/2.815 . Given $ye^x + xe^y + 2x - 5xy + 20 = 0$. Then $dy/dx = y' =$

(a) $\frac{ye^x+e^y+2-5y}{e^x+xe^y-5x}$ ~~(b)~~ $\frac{5y-ye^x-e^y-2}{e^x+xe^y-5x}$ (c) $\frac{e^x+xe^y-5x}{5y-ye^x-e^y-2}$ (d) $\frac{e^x+xe^y-5x}{ye^x+e^y+2-5y}$

$(e^{pi}+16)$/2.816 . Let $Q = (8, 2), A = (6, 8)$ and let B be a point on the line $x = 4$ such that $|QB| + |BA|$ is minimum (see picture). Then $B =$

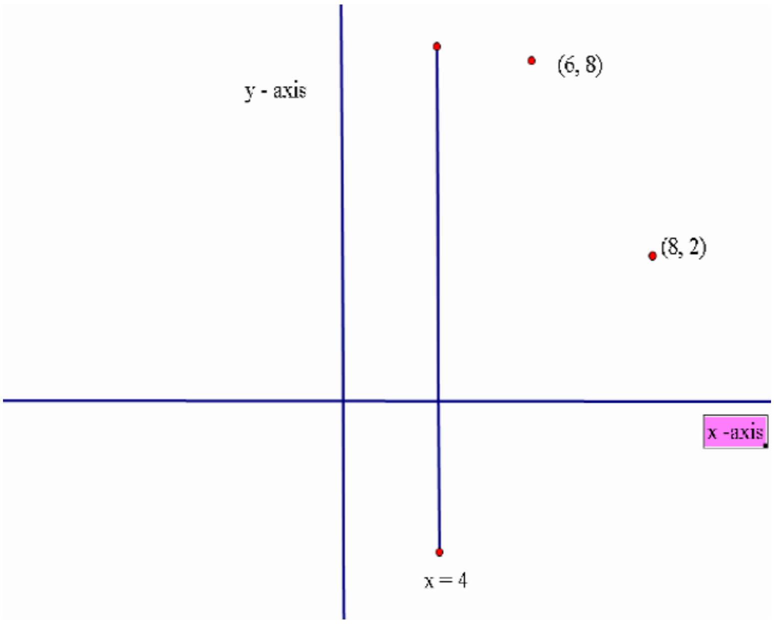

Figure 5. $Q = (8, 2), A = (6, 8)$ find B on $x = 4$ so that $|QB| + |BA|$ is minimum.

(a) (4, 4) ~~(b)~~ (4, 6) (c) (4, 8) (d) (4, 2)

$(e^{pi}+17)$/2.817 . $\int 10x(x^2 + 3)^4\, dx =$

(a) $\frac{(x^2+3)^5}{5} + c$ (b) $2(x^2 + 3)^5 + c$ (c) $\frac{2(x^2+3)^5}{5} + c$ ~~(d)~~ $(x^2 + 3)^5 + c$

$(e^{pi}+18)$/2.818 . $\int 10xe^{(x^2+3)}\, dx =$

(a) $10e^{(x^2+3)} + c$ ~~(b)~~ $5e^{(x^2+3)} + c$ (c) $\frac{5e^{(x^2+3)}}{2x} + c$ (d) $\frac{5e^{(x^2+3)}}{x} + c$

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